Curriculum Vitae: Michael S. Chapman

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CURRENT POSITION

Wurdack Professor of Biochemical Sciences, University of Missouri (2018 -)
Chair, Dept. Biochemistry, University of Missouri (2018 -).

EDUCATION

Post-doctoral	Structural virology	Purdue University, W. Lafayette, IN	1988-93
	Research: *Canine parvovirus, human rhinoviruses – antigenic sites and binding of anti-viral drugs;* Advisor: Michael G. Rossmann		
Ph.D.	Biochemistry	University of California, Los Angeles	1983-7
	Thesis: *The Atomic Structure of Ribulose-1,5-bisphosphate Carboxylase Oxygenase (RuBisCO) from Tobacco;* Advisor: David S. Eisenberg		
M.Sc.	Crystallography	University of London, Birkbeck College	1982-3
B.Sc.(Hons)	Cell/Molecular Biol.	Univ. of London, Kings College	1979-82
A.K.C.	Divinity	University of London, Kings College	1979-82

PAST EMPLOYMENT

Interim Chair	Department of Biochemistry & Molecular Biology, Oregon Health & Science University (OHSU)	2014-18
Richard T. Jones Professor of Structural Biology	Department of Biochemistry & Molecular Biology, Oregon Health & Science University (OHSU)	2006-18
Professor	Department of Chemistry & Biochemistry, Florida State University (FSU)	2003-06

Director	Center of Excellence in Biomolecular Computer Modeling & Simulation, FSU	2000-06
Courtesy faculty appointments:	Department of Biomedical Science (College of Medicine); Departments of Biological Science and of Physics (College of Arts & Sciences), FSU	1997 - 2006
Associate Professor	Department of Chemistry & Biochemistry, FSU	1998-03
Associate Director	Institute of Molecular Biophysics, FSU	1998-01
Assistant Professor	Department of Chemistry, FSU	1993-8
Post-doctoral Assoc.	Department of Biological Science, Purdue University	1988-93
Teaching Associate	Program in Computing, UCLA	1984-5
Teaching Assist/Fell.	Department of Chemistry & Biochemistry, UCLA	1983-5
Research Assistant	National Institute of Research into Dairying (UK)	1979

HONORS & AWARDS

Fellow, American Association for the Advancement of Science	2005-
President's Developing Scholar Award, Florida State University	2000
Council on Research & Creativity, First Year Assistant Professor Award	1994
Science & Engineering Research Council Studentship (UK)	1982-3
British Petroleum Education Trust Scholarship	1979-82

ADMINISTRATION

University of Missouri:

Director, Div. Biochemistry, Coll. Agriculture, Food & Natural Resources (2018 -)

Chair, Department of Biochemistry, School of Medicine (2018 -)

Oregon Health & Science University:

Interim Chair, Dept. Biochemistry & Molecular Biology (2014 - 18)

Director, Quantitative Biosciences & Biomedical Engineering training pgm. (2013 - 18)

Florida State University:

Director, Ctr. Excellence: Biomolecular Computer Modeling & Simulation (2000 - 2006)

Co-director, Program in Computational Biology, School of Computational Science & Information Technology (1999 - 2002)

Associate Director, Institute of Molecular Biophysics (1998 – 2001)

UNIVERSITY SERVICE

University of Missouri:

Translational Precision Medicine Complex, Imaging sub-committee (2018 -)

Missouri Symposium in Molecular Biophysics, co-chair (2019)

Oregon Health & Science University Committees:

Sch. Medicine 1st year Graduate Curriculum Revision Committee: co-chair (2017 - 18)

Prog. Molecular & Cellular Biosciences: Graduate Curriculum Committee (2017 - 18)

Dept. Molecular Microbiology & Immunology; Internal Review Committee (2015).

Center for Spatial Systems Biomedicine; Internal/External Review Committee (2014).

School of Medicine, Collaborative Research Leadership Group & Blueprint taskforce 1 (Research Investment), member (2011 - 18).

Quantitative Biosciences Graduate Program Steering Committee (2012 – 18).

School of Medicine, Conjoint Graduate Curriculum Committee, Chair (2012 – 18).

Program in Molecular & Cellular Biosciences: - Grad. Admissions Committee (2007-14)

Faculty search committee, Ctr. Systems & Spatial Biomedicine, Chair (2012-13).

Faculty search committee, Dept. Molecular & Medical Genetics (2010-11).

Electron Microscopy (EM) Core Facility Steering Committee (2012-).

Oregon Health & Science Department of Biochemistry & Molecular Biology:

Promotions & Tenure Committee (2007-14), Chair (2010-14).

Faculty search committee, Chair (2012-3).

Florida State University Committees:

School of Computational Science and Information Technology:

Executive committee (1995 – 2001)

Curriculum committee (1995 – 2003)

Chair, Faculty search committees (4) (2000 – 2004)

Provost's Faculty Travel Grant Committee (1998 - 2001).

College Teaching Fellowship / Dissertation Fellowship Committee (1999 - 2000).

Florida State University Departmental Service

Advisor, Biochemistry Major (1998 – 9).

Committee Chair – Endowed Chair search in Biocomputational Chem. (1999 – '03).
– Faculty search (1998-9).

Committee Member – Faculty search (1995-6, 2004-5).
– Faculty addition (1997 – 2006); Faculty merit evaluation (1997).
– Computing (1994-7); Seminar (1993-5; 1996-7; 2003)
– Capital Recourses & Space (1994-9; 2003-2005).
– Undergraduate curriculum & advising (1998-9).

Florida State University – Inst. Molecular Biophysics & Structural Biology Program

Committee Chair – Director search (2) (1997 & 2004-5).
– Faculty search (2 recruitments, 2001 - 2004)
– Curriculum (1996 – 2000); Symposium (1999 – 2001)

Committee Member – Executive (1994-6, 1997-2001, 2003-2006)
– Faculty search (8 recruitments, 1993 – 2005)
– Building (1993-7); Seminar (1993-5); Biosafety (1996 – 2001)

PROFESSIONAL ACTIVITIES

Administrative Service:

Associate Director (2018-) Pacific Northwest *Cryo*-EM Center. One of three $42M NIH-supported national centers. One of three PIs responsible for the planning and funding, and with ongoing responsibilities for organizing peer review of applications to use the resources, for oversight of training, and liaison with an external advisory board.

Conference organization:

Symposium co-Chair (2019) 3rd Missouri Symposium in Molecular Biophysics: Structural Electron Microscopy.

Conference Vice Chair, Chair (2000, 2002) Gordon Research Conference: Diffraction Methods in Structural Biology.

Symposium Chair (2001) 4th FSU Structural Biology Symposium: Computational Structural Biology – From Simulation to Experiment and Back

Session Chair: Am. Soc. Virology (1998); NorthWest Crystallography Workshop (2008)

Committees:

MBC – Molecular Biology Consortium - Runs beamline 4.2.2 at the Berkeley synchrotron for a consortium of universities – *Executive committee* (2006 - 18)

SERCAT - Southeast Regional Collaborative Access Team ($16M development of synchrotron data collection facilities at the DOE Advanced Photon Source, Argonne Natl. Lab.)

Executive committee (1999 – 2006)**;** *Operations Management* (1999 – 2002);

Funding (2000 – 2006); *Science* (2004 - 2006);

Delegate, Science Coalition: Meetings w/ Congressional delegation, Washington, 2000

Journal Referee

Acta Crystallographica;	Advances in Microbiology;
Biochemistry;	Biophysical Journal;
Biochimica & Biophysica Acta;	Colloids & Surfaces B: Interfaces;
Comparative Biochem. & Physiol.	Computational & Structural Biotech. J.;
Crit. Rev. Biochemistry & Molecular Biology;	FEBS letters;
Future Virology;	Human Gene Therapy;
HSFP Journal;	Insect Biochemistry & Molecular Biology;
Journal of Biological Chemistry,	J. Chemical Theory & Computation;
J. Crystal Growth;	Journal of Molecular Biology,
Journal of Virology,	Journal of Structural Biology,
Nature;	Nature Communications;
	Nature Structural Biology;
PLoS Biology;	Proceedings of the National Academy, USA;
Protein Science,	Proteins: Structure, Function & Genetics
Science	Structure

Grant Review Panels

National Institutes of Health:

Chair, Special Emphasis Panel: Structural Genomics 2001, 2006

Chair, Special Panels (NCRR / NIGMS): 2001, 2002, 2003, 2009, 2011, 2016

Chair, NIH MIRA review panel: 2019

Member, Macromolecular Structure & Function Panel C: 2005 - 2008

Member, Special Panels:

- NCRR / NIGMS National Centers: 2000, 2001, 2004, 2014(x2)
- Bioengineering (BST), 2 panels 2007
- BST-M Challenge Grants panel 4 2009
- K99 2011
- R35 ZRG1 CB-N MIRA 2017

Temporary member:

- Virology A 2004
- Macromolecular Structure & Function D: 2010, 2014, 2015, 2016, 2017, 2019

Macromolecular Structure & Function Panel B:	2012
Consultant, Neurological Sciences III & Experimental Virology panels	1997

Ad Hoc Grant Review:

Medical Research Council, UK	2010
Biotechnology and Biological Sciences Research Council, UK	2008, 2012-13
Agence National de Recherches, France,	2008
DoD/EPSCoR (Dept. Defense / So. Carolina),	2004
National Science Foundation,	2000 - 2003
Welcome Foundation / UK Government,	2000
Petroleum Research Fund,	1996
International Human Frontier Science Program,	1994-5

Lecturer

International Union of Crystallography Macromolecular Computing School (1996)

NATO Adv. Study Inst. on Direct Methods for Solving Macromolecular Structures (1997)

GRANT SUPPORT

Agency / ID	Title	Role	Dates	Annual direct costs
Am Cancer Soc. F95-FSU-2	Towards Anti-tumor Viruses I: Crystallization of Adenoassociated Virus	PI	2/96 – 1/97	$22,000
NSF BIR94-18741	Application of Real-Space Refinement to Macro-molecular Structure Analysis	PI	04/95-03/98	$75,128
Am. Heart Assoc., FL 9701728	Phosphagen Kinase Structure & Function: Immunoassay for the Diagnosis of Heart Attack	PI	7/97 – 6/99	$45,454
FSU Res. Fdn.	President's Developing Scholar Award	PI	4/00 – 4/01	$10,000
Natl. Science Foundation DBI-9808098	Macromolecular structure: crystallographic structure determination / refinement using atomic electron density functions, and optimization of appropriate force fields for analysis	PI	10/98 - 9/02	$89,995
Am Cancer Soc. RPG-99-356-01-GMC	Towards an Anti-Cancer Virus: Structure & Function of Adenoassociated Virus	PI	7/99 – 12/02	$100,000
Natl. Inst. Health. R01-GM55837	Phosphagen Kinase Structure, Mechanism and Specificity	PI	3/98 – 2/04	$104,695
FSURF Cornerstone	Center of Excellence: Biomolecular Computer Modeling & Simulation *($1M startup + acad. yr. salary to recruit 3 faculty.)*	PI	12/00 – 11/02	$497,553
National Institutes of Health P01 GM04676	Membrane Protein Structural Genomics: *M. tuberculosis*. (Consortium PI = T.A. Cross)	Sub-project PI	9/01 – 8/06	$1,245,352 ($90,038 subcontr.)
National Institutes of Health R13 GM065888	Conference: Diffraction Methods in Structural Biology (Gordon Conference)	PI	5/02 – 4/03	$5,000

Agency / ID	Title	Role	Dates	Annual direct costs
National Institutes of Health R01 GM066875-01	Structure-Function of AAV – a Viral Gene Therapy Vector	PI	2/03 – 7/07	$175,770
National Institutes of Health: GM077643-01	Functional Dynamics during Induced-fit Enzyme Turnover.	PI	2/07 – 1/12	$216,314
National Institutes of Health: GM078538-01	Refinement of Macromolecular Assembly Structure using Electron Microscopy	PI	6/07 – 5/12	$186,803
National Institutes of Health: GM066875-06	Structure-Function of AAV - a Viral Gene Therapy Vector	PI	8/07 – 7/12	$229,391
Off. Naval Res. → Oregon Nano-science & Micro-technologies Inst. N000141010082	Program in Nanoelectronics, Nanobiotechnology, and Nanometrology – task 2.2: DNA delivery targeted to the liver.	task PI	1/10 – 12/10	$220,501
Oregon Health & Science Univ.	Emerging Technology Fund: macromolecular X-ray Diffraction	PI	7/11 – 6/12	$567,102
National Institutes of Health: GM077643-05	Functional Dynamics during Induced-fit Enzyme Turnover.	PI	7/12 – 5/17	$299,860
OR Ctr Spatial Sys Biomedicine OCSSB 614	Visualizing specificity in the targeting of AAV gene therapy vectors.	PI	7/13 – 6/14	$69,968
National Institutes of Health: GM066875-13	Structure-Function of AAV - a Viral Gene Therapy Vector	PI	9/13 – 8/17	$273,090
Oregon Engineer-ing & Technology Industry Council	Quantitative Bioscience & Biomedical Engineering	Director	7/14 – 6/16	$329,981
Hearst Fdn.	Quantitative Bioscience & Bio-medical Engineering Scholars Program	Director	12/14 – 6/18	$250,000

Agency / ID	Title	Role	Dates	Annual direct costs
Oregon Empl. Dept./Oregon Talent Council 16-098-0002	Industry-relevant Training and Research Experiences for Biomedical Engineering and Data Science Students	PI	4/16 – 6/17	$537,992
National Institutes of Health: R35 GM122564-02	Adeno-Associated Virus Gene Therapy Vectors: Molecular Interactions on Cell Entry (MIRA)	PI	8/17 – 7/22	$496,384
National Institutes of Health: U24 GM129547-02 (Gouaux)	Pacific Northwest Center for *Cryo*-EM (J.E. Gouaux, contact PI; J. E. Evans & M.S. Chapman, MPIs)	MPI (assoc. director)	5/18 – 4/24	$3,786,153
National Institutes of Health: U24 GM129547-02S1 (Gouaux)	Pacific Northwest Center for *Cryo*-EM (J.E. Gouaux, contact PI; J. E. Evans & M.S. Chapman, MPIs)	MPI (assoc. director)	5/19 – 4/20	$5,895,797
Univ. Missouri System Strategic Investment Program	Missouri Resource for *Cryo*-Electron Microscopy (D. Burke, J. Tanner, T. White, L. Sumner & X. Yao, Co-Is)	PI	8/19 – 8/21	$2,000,000 + $2,000,000 match

Supporting Roles in Grants

Agency / ID (PI)	Title	Role	Dates	Annual direct costs
Am. Heart Assoc. (S. Bhatia)	Pre-doctoral fellowship: The Atomic and Immunogenic Structure of Adenoassociated Virus - Improving a Gene Therapy Vector	Sponsor	7/99 – 6/01	$16,000
NSF 96-02233 (L. Makowski)	Structural Biology of Macro-molecular Assemblies: A Research Training Group at Florida State University	1 of 5 authors	6/96 – 9/02	$270,021
NSF / Natl. High Mag. Field Lab. IHRP 5024-641-22 project 5045	Functional Dynamics of Arginine Kinase: Development of TROSY-based spectroscopy (PI = Jack Skalicky)	Co-I, assume PI role, 03/04	01/03 – 12/05	$49,700
Am. Heart Assoc. 0315101B (J. Bush)	Pre-doctoral fellowship: Lombricine kinase structure & specificity	Sponsor	7/03 – 6/05	$19,000
Am. Heart Assoc. 0415212B (E.A. Ruben)	Pre-doctoral fellowship: A Computational Study of Arginine Kinase Catalysis	Sponsor	7/04 – 6/07	$21,000
Am. Heart Assoc. 0415115B (O. Davulcu)	Pre-doctoral fellowship: Functional Dynamics of Arginine Kinase	Sponsor	7/04 – 6/06	$20,000
Natl. Inst. Health S10 RR020919 (K.A. Taylor)	Purchase of a large format CCD camera for 3-D EM	Co-PI	4/05 – 3/07	$281,300
Am. Heart Assoc. 0515201B (J. O'Donnell)	Pre-doctoral fellowship: Mapping Adeno-associated virus-2 cellular receptor binding sites using Cryo-Electron Microscopy	Sponsor	7/05 – 6/07	$21,000
Am. Heart Assoc. 0515203B (H.M. Ongley)	Pre-doctoral fellowship: Structural Studies of Adeno-associated Virus Serotypes 3b and 6	Sponsor	7/05 – 6/07	$21,000
Natl. Inst. Health S10 RR024561 (K.A. Taylor)	CryoEM Equipment Enhancements for Florida State University	Major user	3/08 – 2/09	$177,959

Agency / ID (PI)	**Title**	**Role**	**Dates**	**Annual direct costs**
Natl. Inst. Health S10 RR025080 (K.A. Taylor)	Purchase of a FEI Titan Krios for 3-D EM	Major user	7/08 – 6/10	$2,000,000
Off. Naval Res. → Oregon Nano-science & Micro-technologies Inst. (E. Minot)	Electronic detection of single molecule dynamics	co-PI	1/09 – 12/09	$229,736; $5,000 sub-project
Am. Heart Assoc., Pacific Mountain Affiliate 09PRE2020112 (J.C. Summerton)	Pre-doctoral fellowship: The role of stereoelectronics in kinase catalysis	Sponsor	7/09 – 6/11	$25,000
Am. Heart Assoc., Pacific Mountain Affiliate 10POST2600203 (T.F. Lerch)	Post-doctoral fellowship: The Structure and Function of Adeno-Associated Virus (AAV) – a Viral Gene Therapy Vector	Sponsor	1/10 – 12/11	$48,428
Vertex Inc. (J.C. Summerton)	Vertex Scholarship	Faculty mentor	7/11 – 6/12	$25,000
Natl. Inst. Health S10 OD018518 (E.J. Barbar, OSU)	Acquisition of a 700 MHz NMR Spectrometer	Major user	2/15 – 2/17	$1,300,000
M.J. Murdock Charitable Trust (E.J. Barbar, OSU)	Upgrade to an 800 MHz NMR Spectrometer	Major user	2/15 – 2/17	$504,000

PUBLICATIONS

1. Chapman, M. S., Smith, W. W., Suh, S. W., Cascio, D., Howard, A., Hamlin, R., Xuong, N. H. & Eisenberg, D. (1986). Structural studies of RuBisCO from tobacco. ***Phil. Trans. Roy. Soc. Lond.*** B313, 367-378. PMID: 2878449.
2. Chapman, M., Suh, S. W., Cascio, D., Smith, W. W. & Eisenberg, D. (1987). Sliding-layer conformational change limited by quaternary structure in plant RuBisCO. ***Nature*** 329, 354-356. PMID: 3627277.
3. Eisenberg, D., Almassy, R. J., Janson, C. A., Chapman, M. S., Suh, S. W., Cascio, D. & Smith, W. W. (1987). Some Evolutionary Relationships of the Primary Biological Catalysts Glutamine Synthetase and RuBisCO. ***Cold Spr. Har. Symp. Quant. Biol.*** LII, 483-90. PMID: 2900091.
4. Eisenberg, D., Chapman, M. S., Suh, S. W., Cascio, D. & Smith, W. W. (1987). The Path of the Polypeptide Backbone of Ribulose-1,-5-*bis*-phosphate from *Nicotiana tabacum*. In *International Workshop on Ribulose-1,-5-bis-phosphate carboxylase-oxygenase* (Bohnert, H. J. & Jensen, R. G., eds.). University of Arizona Press, Tuscon, AZ.
5. Suh, S. W., Cascio, D., Chapman, M. S. & Eisenberg, D. S. (1987). A Crystal Form of Ribulose-1,-5-*bis*-phosphate Carboxylase--Oxygenase from *Nicotiana tabacum* in the Activated state. ***J. Mol. Biol.*** 197, 363-365. PMID: 3681999.
6. Chapman, M. S., Suh, S. W., Curmi, P. M. G., Cascio, D., Smith, W. W. & Eisenberg, D. S. (1988). Tertiary Structure of Plant RuBisCO: Domains and their Contacts. ***Science*** 241, 71-74. PMID: 3133767.
7. Hajdu, J., Clifton, I. J., Hadfield, A., Howell, P. L., Almo, S. C., Petsko, G. A., Greenhough, T. J., Shrive, A. K., Campbell, J. W., Parson, M., Harrison, S. C., Liddington, R. C., Rossmann, M. G. & Chapman, M. (1989). *Laue Crystallography of Macromolecules and Viruses*. In **Daresbury Annal**. (Warrington, UK, Daresbury Laboratory) pp. 42-46.
8. Kim, S., Smith, T. J., Chapman, M. S., Rossmann, M. G., Pevear, D. C., Dutko, F. J., Felock, P. J., Diana, G. D. & McKinlay, M. A. (1989). Crystal Structure of Human Rhinovirus Serotype 1A (HRV1A). ***J. Mol. Biol.*** 210**,** 91-111. PMID: 2555523.
9. Chapman, M. S., Giranda, V. L. & Rossmann, M. G. (1990). The Structures of Human Rhinovirus and Mengo Virus: Relevance to Function and Drug Design. ***Sem. Virol.*** 1, 413-27.
10. Giranda, V. L., Chapman, M. S. & Rossmann, M. G. (1990). Modelling of the Human Intercellular Adhesion Molecule-1, the Human Rhinovirus Major Group Receptor. ***Proteins*** 7, 227-33. PMID: 1972986.
11. Giranda, V. L., Chapman, M. S., Rossmann, M. G., Staunton, D. & Springer, T. A. (1990). Modelling of the C1 Intercellular Adhesion Molecule 1 (ICAM-1), the Human Rhinovirus Major Group Receptor. In New Aspects of Positive Strand RNA Viruses, M.A. Brinton, and F.X. Heinz, eds. (Washington, DC: ASM Press).
12. Chapman, M. S., Minor, I., Rossmann, M. G., Diana, G. D. & Andries, K. (1991). Human rhinovirus 14 complexed with antiviral compound R 61837. ***J. Mol. Biol.*** 217, 455-63. PMID: 1847215.
13. Tsao, J., Chapman, M. S., Agbandje, M., Keller, W., Smith, K., Wu, H., Luo, M., Smith, T. J., Rossmann, M. G., Compans, R. W. & Parrish, C. (1991). The Three-Dimensional Structure of Canine Parvovirus and its Functional Implications. ***Science*** 251, 1456-1464. PMID: 2006420.

14. Chapman, M. S., Tsao, J. & Rossmann, M. G. (1992). *Ab initio* Phase Determination for Spherical Viruses: Parameter Determination for Spherical Shell Models. ***Acta Crystallogr.*** A48, 301-312. PMID: 1605933.
15. Mallamo, J. P., Diana, G. D., Pevear, D. C., Dutko, F. J., Chapman, M. S., Kim, K. H., Minor, I., Oliveira, M. & Rossmann, M. G. (1992). Conformationally Restricted Analogues of Disoxaril: A comparison of the Activity against Human Rhinovirus Type 14 and 1A. ***J. Med. Chem.*** 35, 4690-4695. PMID: 1335081.
16. Tsao, J., Chapman, M. S. & Rossmann, M. G. (1992). *Ab initio* Phase Determination for Viruses with High Symmetry: A Feasibility Study. ***Acta Crystallogr.*** A48, 293-301. PMID: 1318726.
17. Tsao, J., Chapman, M. S., Wu, H., Agbandje, M., Keller, W. & Rossmann, M. G. (1992). Structure Determination of Monoclinic Canine Parvovirus. ***Acta Crystallogr.*** B48, 75-88. PMID: 1616694.
18. Chapman, M. S. (1993). Mapping the Surface Properties of Macromolecules. ***Prot. Sci.*** 2, 459-469. PMID: 8384042.
19. Chapman, M. S., Kim, K. H. & Rossmann, M. G. (1993). Structural Comparisons of Several Antiviral Agents Complexed with Human Rhinoviruses of Different Serotypes. ***Antiviral News*** 1, 53-53.
20. Chapman, M. S. & Rossmann, M. G. (1993). Structure, Sequence and Function Correlations among Parvoviruses. ***Virology*** 194, 491-508. PMID: 8503170.
21. Chapman, M. S. & Rossmann, M. G. (1993). Comparison of Surface Properties of Picornaviruses: Strategies for hiding the Receptor Site form Immune Surveillance. ***Virology*** 195, 745-765. PMID: 8337843.
22. Kim, K. H., Willingmann, P., Gong, Z. X., Kremer, M. J., Chapman, M. S., Minor, I., Oliviera, M. A., Rossmann, M. G., Andries, K., Diana, G. D., Dutko, F. J., McKinlay, M. A. & Pevear, D. C. (1993). A comparison of the anti-rhinoviral drug binding pocket in HRV14 and HRV1A. ***J. Mol. Biol.*** 230, 206-227. PMID: 8383771.
23. Chapman, M. S. (1994). Sequence Similarity Scores and the Inference of Structure/Function Relationships. ***Computer Applications in the Biosciences (CABIOS)*** 10, 111-119. PMID: 8019858.
24. Chapman, M. S. (1995). Restrained Real-Space Macromolecular Atomic Refinement using a New Resolution-Dependent Electron Density Function. ***Acta Crystallogr.*** A51, 69-80. doi:10.1107/S0108767394007130
25. Chapman, M. S. & Rossmann, M. G. (1995). Single-stranded DNA-protein interactions in Canine Parvovirus. ***Structure*** 3, 151-62. PMID: 7735832.
26. Hadfield, A., Hajdu, J., Chapman, M. S. & Rossmann, M. G. (1995). Laue Diffraction Studies of Human Rhinovirus 14 and Canine Parvovirus. ***Acta Crystallogr.*** D51, 859-70. PMID: 15299756.
27. Chapman, M. S. & Rossmann, M. G. (1996). Structural Refinement of the DNA-containing Capsid of Canine Parvovirus using ***RSRef***, a Resolution-Dependent Stereochemically Restrained Real-Space Refinement Method. ***Acta Crystallogr.*** D52, 129-39. PMID: 15299734.
28. Chapman, M. S. (1996). Cross-validation R-factors and their use in comparing the qualities of refined models for the DNA-containing and empty capsids of canine parvovirus. ***Acta Crystallogr.*** D52, 140-2. PMID: 15299734.
29. Xie, Q. & Chapman, M. S. (1996). Canine parvovirus capsid structure, analyzed at 2.9 Å resolution. ***J. Mol. Biol.*** 264, 497-520. PMID: 8969301.
30. Zhou, G., Parthasarathy, G., Somasunduram, T., Ables, A., Roy, L., Strong, S. J., Ellington, W. R. & Chapman, M. S. (1997). Expression, Purification from Inclusion Bodies, and Crystal Characterization of Transition State Analog Complex of Arginine

Kinase: a Model for Studying Phosphagen Kinases. ***Prot. Sci.*** 6, 444-9. PMID: 9041648.
31. Blanc, E. & Chapman, M. S. (1997). *RSRef*: Interactive real-space refinement with stereochemical restraints for use during model-building. ***J. Appl. Cryst.*** 30: 566-7. doi:10.1107/S002188989700592X
32. Chapman, M. S. & Blanc, E. (1997). Potential use of Real Space Refinement in Protein Structure Determination. ***Acta Crystallogr.*** D53, 203-6. PMID: 15299957.
33. Chapman, M. S. (1998). Watching "One's" Ps and Qs: Promiscuity, Plasticity and Quasi-Equivalence in a T=1 virus. ***Biophys. J.*** 74: 639-44. PMID: 9449365.
34. Chapman, M. S. (1998). Introduction to the use of non-crystallographic symmetry in phasing. In *Direct Methods for Solving Macromolecular Structures* (Fortier, S., ed.), pp. 99-108. Kluwer, Dortrecht, Netherlands.
35. Chapman, M. S., Blanc, E., Johnson, J. E., McKenna, R., Munshi, S., Rossmann, M. G. & Tsao, J. (1998). Use of non-crystallographic symmetry for ab initio phasing of virus structures. In *Direct Methods for Solving Macromolecular Structures* (Fortier, S., ed.), pp. 433-442. Kluwer, Dortrecht, Netherlands.
36. Blanc, E., Chen, Z. & Chapman, M. S. (1998). Real-Space Refinement Using RSRef. In *Direct Methods for Solving Macromolecular Structures* (Fortier, S., ed.), pp. 513-9. Kluwer, Dortrecht, Netherlands.
37. Zhou, G., Wang, J., Blanc, E. & Chapman, M. S. (1998). Determination of the Relative Precision of Atoms in a Macromolecular Structure. ***Acta Crystallographica*** D54, 391-9. PMID: 9761907.
38. Zhou, G., Somasundaram, T., Blanc, E., Parthsarathy, G., Ellington, W. R. & Chapman, M. S. (1998). Transition state structure of arginine kinase: Implications for catalysis of bimolecular reactions. ***Proceedings of the National Academy of Sciences, USA*** 95, 8449-54. PMID: 9671698.
39. Chen, Z., Blanc, E. & Chapman, M. S. (1998). Real Space Molecular Dynamics Refinement. ***Acta Crystallographica*** D55: 464-8. PMID: 10089356.
40. Chen, Z., Blanc, E. & Chapman, M. S. (1999). Improved free R-factors for the cross-validation of structures. ***Acta Crystallographica*** D55: 219-224. PMID: 10089412.
41. Zhou, G., Somasundaram, T., Blanc, E. & Chapman, M. S. (1999). Critical Initial Real Space Refinement in the Structure Determination of Arginine Kinase. ***Acta Crystallographica*** D55: 835-845. PMID: 10089314.
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RESEARCH MENTORING

Name	Program	Dates	Subsequent employment
Genfa Zhou	Ph.D., Molecular Biophysics	1994 – 1998	Post-doc, Harvard U.; now CEO FusoGen Pharmaceuticals, Inc.
Eric Blanc	Post-doc.	1995 - 1998	Res. staff, Global Phasing, Ltd.; then Res. Sci., European Bioinformatics Inst.; Lecturer, Bioinformatics, Kings Coll. London; Curr.: Bioinformatician, Charité Hosp., Berlin.
Jeff Haber	M.S. Biochemistry	1996 – 1999	Law school, U. Michigan; Private practice, Washington, DC.
Qing Xie	Ph.D., Biochemistry	1993 – 2000	Snr. Res. Assoc., Oregon Health & Science University
Zhi Chen	Ph.D., Physics	1994 - 2000	Post-doc., Howard Hughes Medical Inst. & Brandeis University; Res. Assoc., MIT (2009-13). Assist. Prof. Oregon Health & Science Univ.
Richard Bertram	Post-doc.	1999 – 2001	Assist. Professor (2001-5); Assoc. Prof. (2005-9); Prof. & Director Biomedical Math, Florida State Univ. (2009-)
Pam Pruett	Post-doc.	1996 – 2002	Staff scientist, Univ. Alabama at Birmingham
Mohammad Yousef	Ph.D., Molecular Biophysics	1998 – 2002	Post-doc., HHMI/Univ. Oregon then Assist Prof. Biophysics, Univ. Cairo (July 2006). Res. Assoc. Texas Tech. U. (2009-11); Assist. Prof., Dept. Physics, Southern Illinois Univ. (2011-6); Assoc. Prof. (2016-)
Arezki Azzi	Post-doc.	1999 – 2003	Staff Scientist, Laval Univ., Canada; Prof. Biochem./Mol. Biol., Al-Imam Mohammad ibn Saud Univ., Saudi Arabia

Name	Program	Dates	Subsequent employment
Smita Bhatia	Ph.D., Molecular Biophysics	1997 – 2003	Post-doc., National Research Council, Canada; curr. Snr. Manager, Economics & Environment, Chemical Industry Assoc. of Canada.
Andrei Korostelev	Ph.D., Biochemistry	1999 – 2003	Post-doc., FSU; Post-doc. UC Santa Cruz. (’04-10); Assoc. Prof., U. Mass., Worcester.
Jim Gattis	Ph.D., Biochemistry,	1997– 2004	Post-doc., National Cancer Inst. ’04-‘08; Principle Scientist, Glaxo Smith-Kline (’08-’09); Group Leader, PPDi (2010-2); Snr. Scientist, Liquidia Technologies (2012-).
Jared Pikus	M.S., Biochemistry	2003-04	DO, Philadelphia Coll. Osteopathic Med., 2009; Resident, Utah Valley Family Medical Residency Prog. (2009-12), Family Physician, Cottonwood, ID (2012-).
Shawn Clark	Ph.D., Biochemistry	1998– 2006	Res. Assist, then post-doc fellow, Harvard Univ. & Max Planck Inst. (’04-’07); Senior Scientist, XTAL Biostructures (‘07- 13); President & Chairman DeltaTm Technologies Inc.
Felcy Fabiola	Post-doc.	2000-06	Home-maker; Consultant (2006-); Systems Project Analyst, Florida Board of Governors (2016-)
Weishu Bu	Ph.D., Molecular Biophys.	1999– 2007	Post-doc. Univ. Michigan (’07-09); Res. Assoc. Veterans Admin, Ann Arbor, MI (’09-); Instructor, Washtenaw Comm. Coll., Ann Arbor, MI (’13-).
Donald “Jeff” Bush	Ph.D., Biochem.	1999– 2007	Post-doc., Univ. Alabama, Birmingham (2007-8); Chemist-3, Dept. Agriculture & Consumer Affairs, State of Florida.
Pankaj Pal	B.S. Biochemistry, Honors thesis	2003– 07	M.D./Ph.D. Washington Univ., 2007-15 Marjorie Schooch (φβφ) fellow; Resident, Internal Medicine, Beth Deaconess Hosp.

Name	Program	Dates	Subsequent employment
Eliza Ruben	Ph.D., Molecular Biophys.	2000–07	Post-doc., Stanford Univ (2007-12); Staff Sci., Stanford Univ. (2012-13) Director, Protein Expression Core, Univ. Oklahoma (2013 - 2017) Staff Scientist, St. Louis Univ. (2017-)
Omar Davulcu	Ph.D., Biochemistry	2002–07	Post-doc., Snr. Res. Assoc., Oregon Health & Sciences Univ. (2007-18); Snr. Scientist, Pfizer, St. Louis (2018 -)
Dan Mitchell	Ph.D., Molecular Biophys., 6/08	2000–08	NRC Associate, US Army Medical Res. Inst. of Infectious Diseases (2008-11); Staff Sci., Texas Biomed. Res. Inst. (2011-).
Heather Ongley	M.S. Biochemistry	2003-08	Jnr. Dental Assist., Broward Co., Florida
Jason O'Donnell	Ph.D. Biochemistry	2003-4/09	Post-doc., Florida State Univ. (2009-11); Post-doc. Univ. Georgia (2011-4); Lecturer, Univ. Georgia (2014-)
Olga Kirillova	Post-doc.	2008-11	ICOLL LLC. Founder, 2011-13; Rentrak Corp., Data analytics software, 2013 -
Sudha Dorairaj	Post-doc.	2010-11	Adjunct Assist. Prof., Univ. Portland; Mother, San Diego.
Dustin McCraw	Ph.D. Biochemistry & Molecular Biology	2005-12	Post-doc., Natl. Inst. Allergy & Infectious Diseases (2013 -)
Thomas F. Lerch	Post-doc.	2007-12	Senior Scientist, Pfizer, St. Louis
Jean C. Summerton	Ph.D. Biochemistry & Molecular Biology	2007-14	Post-doc., Onco-Tools, LLC. Philomath, OR (2014 -)
Chiara Del Picollo	Ph.D. Biochemistry & Molecular Biology	2014-16	Personal leave / withdrawn; deceased (2018).
Geoffrey Diemer	Post-doc.	2015-16	Snr. Assoc. Scientist, Vaccine & Gene Therapy Inst., OHSU (2016-)

Name	**Program**	**Dates**	**Subsequent employment**
Mark Silveria	Ph.D. Biochemistry	2019-	
Undergraduate students:		46	1993-2019

TEACHING

Course Title	**Level**	**Credit hours**	**Role**	**Enroll-ment**	**Comment**	
Enzyme Structure & Function:	Grad.	3	Instructor, whole course	20 - 30	Redesigned	1994 – 2005 (annual)
Macromolecular Crystallography:	Grad.	3	Instructor, whole course	10-22	New course	1993 – 2006 (biannual)
General Chemistry:	U-Grad.	3	Instructor, whole course	150		1995
General Biochemistry II:	U-Grad.	3	Instructor, whole course	75 - 140		1999, 2005
Medical Biochemistry:	Medical student	3	Lecturer (1 of 6); case-based learning facilitator	40	New course	2002, 2003
Bioinformatics:	Grad / U-grad.	2	Coordinator, 2003, Lecturer (1 of 6)	12	New course	2002, Sp '03, Fa '03
Molecular Biophysics and Experimental Bioinformatics:	Grad	3	Lecturer (1 of 9)	9	CONJ668	Sp 2007-17
PMCB Journal Club:	Grad	2	Lecturer / Facilitator	17	CONJ605 – Faculty team	Fa 2008
Cell Structure & Function	Medical student		Facilitator	20	Faculty team	Fa 2009-10
HHMI Biophysics Workshop	Faculty / Grad / U-grad		Instructor	12	4 x 3-hr workshops on crystal-lography	Fa 2009
Introductory Biophysics	Grad / U-grad		Course director, Instructor	12	New course, team-taught	Winter 2011-13
Advanced Biophysics	Grad / U-grad		Course director, Instructor	10	New course, team-taught	Spring 2011-12
Biophysics Book Club	Grad / Post-doc		Faculty mentor	15	New "journal club"	2011-12 academic year
Gene & Cell Therapy	Grad		Team instructor	10		2013 - (annual)

Course Title	Level	Credit hours	Role	Enroll-ment	Comment	
Fundamentals of Medicine	Medical student		Team Lecturer, Facilitator	139	New course	Fa 2014
Foundations of Measurement Science	Grad		Developer, Team Lecturer	6	New course	Fa 2014-15
Analysis in Quantitative Science	Grad		Developer, Team Lecturer	3	New course	Winter 2015-17
Biochemistry (Biochm 4270/7270)	U-grad / Grad		Substitute instructor, 1 week	141	Comprehensive course, semester 1 of 2	Fall 2018
Ethical conduct of Research (Biochm 8060)	Grad		Facilitator, 1 week	10	Discussion section	Spr 2019

SEMINARS & CONFERENCE TALKS

The Path of the Polypeptide Backbone of Ribulose-1,-5-bis-phosphate from Nicotiana tabacum, in International Workshop on Ribulose-1,-5-bis-phosphate carboxylase-oxygenase, 1987, Tuscon, AZ.

The Partial Structure of Ribulose-1,5-Bisphosphate Carboxylase Oxygenase (RuBisCO). in Annual meeting, American Crystallographic Association. 1986. Hamilton, Ontario, Canada.

Sequence-Structure Correlations among Picornaviruses and to Parvoviruses. in American Society for Virology. 1992.

The Refined Structure of Canine Parvovirus Full Particles. in 5th Parvovirus Workshop. 1993. Crystal River, FL.

Structure, Sequence, and Function Correlations among Parvoviruses. in 5th Parvovirus Workshop. 1993. Crystal River, FL.

The refined structure of canine parvovirus: DNA-protein interactions and encapsidation, in American Society for Virology. 1994: Madison, WI.

Single-stranded DNA-protein interactions in the refined structure of canine parvovirus (CPV), in American Crystallographic Association, Annual meeting. 1994: Atlanta, GA.

Structural Studies of Parvoviruses. in VIth Parvovirus Workshop. 1995. Montpellier, France: Societe Francais de Microbiologie.

Parvoviral Structure in VIth Parvovirus Workshop. 1995. Montpellier, France: Societe Francais de Microbiologie.

Ab Initio Phase Determination for Viruses: The Use of Non-Crystallographic Symmetry for Phase Refinement. in XVII Congress and General Assembly of the International Union of Crystallography. 1996. Seattle, WA

Real space refinement. in Gordon Research Conference: Diffraction Methods in Molecular Biology. 1996. Proctor Academy, NH.

Towards an Engineered Anti-Cancer Virus: Crystallographic Investigation of Adeno-Associated Virus (AAV). in American Cancer Society, Florida Division Inc., Research Seminar. 1996. Orlando, FL.

Icosahedral Virus Structure: The Devil in the Detail. Quasi-equivalence: Motion and Adaptability in Living Molecules, 1997, Tallahassee, FL.

Seminar: Baxter Health Products Inc., (1997);

Seminar: Targeted Genetics Inc. (1997);

Seminar: Chemistry Departmental, Florida State University (1997);

Electron Density Representation and Real Space Refinement (New tricks from an old dog)., in International Union of Crystallography Workshop on Computing Techniques, 1997, Bellingham, WA.

Introduction to the use of non-crystallographic symmetry in phasing. in NATO Advanced Study Institute on Direct Methods for Solving Macromolecular Structures. 1997. Erice, Italy.

Use of non-crystallographic symmetry for ab initio phasing of virus structures. in NATO Advanced Study Institute on Direct Methods for Solving Macromolecular Structures. 1997. Erice, Italy.

Structural Studies of Cellular Energy Buffering and Virus-Drug Complexes. in Florida Division of the American Chemical Society. 1997. Orlando, FL.

Real-space refinement in Computing in Crystallography & NMR, Cold Spring Harbor Symposium, 1997

Real-Space Refinement Using RSRef. in NATO Advanced Study Institute on Direct Methods for Solving Macromolecular Structures. 1997. Erice, Italy.

Preliminary Crystal Characterization of Adeno-Associated Virus 2. in 7th International Parvovirus Workshop. 1997. Heidelberg, Germany.

Seminar FSU/FAMU Chemical Engineering (1998);

Seminar: Florida Southern College (1998);

Seminar: Florida State University Martech (1998);

Seminar: Mercer College (1998);

Transition State Structure of Arginine Kinase: Implications for the Enzyme Catalysis of Bimolecular Reactions. American Chemical Society, Florida Division, 1999, Orlando, FL.

Seminar: Rutgers University (1999);

Seminar: University of South Florida (2000).

Towards the Atomic Structure of the Adenoassociated Virus 2 Capsid. in VIII th Parvovirus Workshop. 2000. Mt. Tremblant, Canada

Seminar: Eastern Carolina University (2002);

Seminar: California State University, Fullerton (2002);

Real-Space Simulated Annealing Refinement - A tool in model-building and a paradigm for holistic refinement. in Interdisciplinary Workshop Promoting Collaboration In High-Throughput X-ray Structure Determination. 2002. Santa Fe, NM: Los Alamos National Laboratory.

Seminar: ETH – Zurich (2002);

The Atomic Structure of Adeno-Associated Virus 2 at 3.0 Å Resolution. in The IX Parvovirus Workshop. 2002. Bologna, Italy.

Seminar: Beckman Institute & Dept. Physics, Univ. Illinois at Urbane-Champagne, 2003.

Fitting known structures to EM maps - real-space refinement with stereochemical restraints. Gordon Research Conference: 3D Electron Microscopy, 2003.

Far from the MADing crowd: infectious and reactionary research. SERCAT Symposium, Univ. Alabama at Birmingham, 2004.

Seminar: Structural Enzymology of Arginine Kinase - a Paradigm for the Catalysis of Two-Substrate Reactions, Dept. Biochemistry & Molecular Biology, Indiana University Medical School, 2004.

Adeno-associated Virus – Structural studies of a gene therapy vector. National Synchrotron Light Source Workshop: Anatomy of a Virus, 2004

Holistic Macromolecular Models – When One Technique is Not Enough. Keynote lecture, EMSL 2004 Workshop; Pacific Northwest Laboratories.

The Structure of AAV. FASEB meeting: Virus Assembly, 2004

Viral Engineering – Where Biology meets Physics. Joint meeting of the National Societies for Black and Hispanic Physicists (2005).

Seminar: Still Learning about Enzyme Catalysis with Arginine Kinase, Ctr. for Biomolecular Structure & Dynamics, University of Montana, 2005.

Seminar: New tricks from an old dog; The structural enzymology of arginine kinase., Dept. Biochemistry & Molecular Biology, Oregon Health Sciences University, 2006.

Seminar: New tricks from an old dog; The structural enzymology of arginine kinase., Dept. Biochemistry & Molecular Biology, Wayne State University, 2006.

Seminar: New tricks from an old dog; The structural enzymology of arginine kinase., Dept. Biochemistry & Molecular Biology, University of Georgia, 2006.

NCS and Bias in free R-factors. in Gordon Research Conference: Diffraction Methods in Structural Biology, Lewiston, ME, 2006.

Structure and Function of Adeno-Associated Virus Capsids. in The XIth Parvovirus Workshop. 2006. Les Diablerets, Switzerland.

Seminar: More than Structure: Stereoelectronics and Dynamics in Arginine Kinase, Oregon State University, 2008.

Seminar: More than Structure: Stereoelectronics and Dynamics in Arginine Kinase, University of Colorado Health Science University, 2008.

Seminar: More than Structure: Stereoelectronics and Dynamics in Arginine Kinase, Oregon Graduate Institute, 2008.

Accuracy of Pseudoatomic models fit into Cryo-Electron Microscopy Density Reconstructions, Hybrid Methods conference, Tahoe, CA, 2008.

Accuracy of Pseudoatomic models fit into Cryo-Electron Microscopy Density Reconstructions, Maxinf2 Workshop: New algorithms in Macromolecular Crystallography and Electron Microscopy, Leiden, Netherlands, 2008.

Structural Studies of Adeno-Associated Viruses: Crystal Structure of AAV-6 and Electron Microscopy of AAV-2 Complexed with Heparan Sulfate Analogs, XII Parvovirus Workshop, Córdoba, Spain, 2008.

Workings of Arginine Kinase – Crystallographic, NMR & Quantum Mechanical Studies, West Coast Protein Crystallography Workshop, Asilomar, CA, 2009.

Seminar: Workings of Arginine Kinase – Crystallographic, NMR & Quantum Mechanical Studies, Uppsala University, Sweden, 2009.

Nearly Natural – A Structural Foundation for Viral-based DNA Delivery Vectors, Micro Nano Breakthrough Conference, Portland, OR, 2009

Seminar: Beyond Structure - A Dynamic Enzyme!, Reed College, 2009

Structural Studies with Implications for Cell Attachment. XIIIth Parvovirus Workshop (Helsinki, Finland, 2010).

Hybrid Structure Refinement Algorithms: Precisely is the Point. In Gordon Research Conference: 3D Electron Microscopy; New London, NH., 2011

DNA delivery targeted to the liver. In Oregon Nanoscience and Microtechnologies Institute Conference, Portland, 2011

Improving delivery in Human Gene Therapy. Imaging Adeno-Associated Virus at near-atomic resolution. In Biomedicine in 4D; Portland, OR, 2012

Structure of the Retargeted Vector, AAV-DJ. In IXth Parvovirus Workshop, Ithaca, NY, 2012

Gene Therapy Delivery: Interactions of AAV Vectors at near-atomic resolution. Dept. Biomedical Engineering, Oregon Health & Sciences University, 2012.

Visualizing Molecular Specificity in the Targeting of AAV Gene Therapy Vectors. OHSU Center for Spatial Systems Biomedicine, 2013.

Vector Delivery: AAV's 1st Cellular Encounters. OHSU Gene Therapy Symposium, 2013.

Seminar: Arginine Kinase – A Dynamic Enzyme. Lewis & Clark University, 2014.

AAV Attachment – Binding and Structural Studies. In Xth Parvovirus Workshop, Bordeaux, France, 2014

Functional Dynamics during Induced Fit Turnover. Oregon State University, 2014.

Seminar: Cell Entry by Adeno-Associated Virus. Dept. Biochem. & Mol. Biol., Oregon Health & Science University, 2015.

An Essential & Ubiquitous Protein Receptor for AAV; Glycans as Attachment Receptors. Invited talk: Presidential Symposium of Am. Soc. Gene & Cell Therapy, 2016.

An Essential & Ubiquitous Protein Receptor for AAV; Glycans as Attachment Receptors. In XIth Parvovirus Workshop, Ajaccio, France, 2016

Adeno-Associate Virus: Cell Entry. Caspar Structural Biology Symposium, Florida State University, 2017.

Seminar: Visualizing & Modeling Conformational Flexibility. Dept. Biochem. & Mol. Biol., Oregon Health & Science University, 2017.

Seminar: Seeing and believing: AAV and the cellular entry of a gene therapy vector. Dept. Biochem. & Mol. Biol., Indiana University, 2017.

Rate-limiting conformational change along the reaction path of an enzyme. BioNMR Symposium, Oregon State University, 2017.

Seminar: Seeing and believing: AAV and the cellular entry of a gene therapy vector. PacNow QB Meeting, Reed College, OR, 2017.

So, what are we working on? AAV, cell entry and lessons of mistaken identity when venturing outside the "Rossmann fold". Rossmann Symposium, Purdue University, IN, 2017

Interactions of AAV-2 with its Cellular Receptor (AAVR), visualized by cryo-Electron Microscopy, Am. Soc. Gene & Cell Therapy, 2018.

Interactions of AAV-2 with its Cellular Receptor (AAVR), visualized by cryo-Electron Microscopy, XIIth Parvovirus Workshop, Miami, FL, 2018.

AAV cell entry: Structural Biology foundations for Gene Therapy Delivery; Seminar, Department of Medical Pharmacology & Physiology, Univ. Missouri, Sept. 2018.

Binding of the AAV viral gene therapy vector to its cell receptor: Hybrid electron microscopy visualization of a flexible multi-domain complex. St. Louis Univ. Structural Biology Symposium, December, 2018.

AAV cell entry: Structural Biology foundations for Gene Therapy Delivery; Seminar, School of Biological Sciences, University of Missouri, Kansas City, December, 2018.

Invited speaker, 8th CASSS International Symposium on the Higher Order Structure of Protein Therapeutics, San Mateo, CA, April 2019.

Seminar, University of Massachusetts Medical School, Worcester, MA, May 2019.

Seminar, Schepens Eye Research Inst., Harvard University, Boston, MA, May 2019.