

William “Bil” Clemons, Jr.

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Education

- Ph.D. Biochemistry**, University of Utah December 2000
Salt Lake City, Utah and MRC Laboratory of Molecular Biology,
Cambridge, United Kingdom
- B.S. Biochemistry**, Virginia Tech, Blacksburg, Virginia May 1995
Minors in Chemistry and Biology

Appointments

2013 – Present **Professor of Biochemistry**

2006 – 2013 **Assistant Professor of Biochemistry**
Division of Chemistry and Chemical Engineering
California Institute of Technology, Pasadena, California, USA

Research Experience

- 2001 – 2005 Research Fellow: Structural studies of the bacterial protein translocation channel using X-ray crystallography and electron microscopy in the lab of Prof. Tom Rapoport, Ph.D., Cell Biology Dept., Harvard Medical School, Boston, Massachusetts
- 1996 – 2000 Graduate research: Crystallographic studies of the bacterial small ribosomal subunit and protein structures involved in translation in the lab of Prof. Venki Ramakrishnan, Ph.D. Structural Studies Division, MRC Laboratory of Molecular Biology, Cambridge UK and the Biochemistry Department, University of Utah, Salt Lake City, Utah.
- 1993 - 1995 Undergraduate research: Enzyme kinetics experiments of enzymes involved in the pathogenic life cycle of the yeast *C. albicans* in the lab of Prof. Walter Niehaus, Ph.D., Biochemistry Department, Virginia Tech, Blacksburg, Virginia.

Honors

NIH Pioneer Award	2011-2016
Searle Scholar Fellow	2007-2010
Burroughs Wellcome Career Award in the Biomedical Sciences	2005-2010
Damon Runyon Cancer Research Foundation Fellowship	2002-2004
Max Perutz Award, LMB, Cambridge	2001
NIH Predoctoral Fellowship	1997-2000
NIH Biological Chemistry Training Grant	1996-1997

Publications

1. Katrin Tiemann, Michel Niesen, Rachel Galimidi, Tom Miller, III, William Clemons, Jr, Axel Müller. “Expressing the unexpressable: Membrane protein expression controlled at the sequence level.” (2013) **Submitted**
2. Amanda Mock, Justin Chartron, Ma’ayan Zaslaver, Yihong Ye & William Clemons, Jr. “The architecture of the Bag6 transmembrane recognition complex includes a ‘mock’ BAG domain.” (2013) **In revision**
3. Axel Müller, Morgan Beeby, Alasdair W. McDowall, Janet Chow, Grant Jensen & William M. Clemons, Jr. “The ultrastructure and complex polar architecture of the human pathogen *Campylobacter jejuni*.” (2013) **In revision**

4. Harry Gristick, Meera Rao, Justin Chartron, Michael Rome, Shu-ou Shan & William Clemons, Jr. "The structure of a tail-anchor membrane protein-binding complex reveals the regulation of Get3 by Get4." (2013) Nature Struct Mol Biol v21 n5 pp437-42. Epub Apr 13th. PMID: 24727835.
5. Yanfen Liu, Nia Soetandyo, Jin-gu Lee, Liping Liu, Yue Xu, William M. Clemons Jr & Yihong Ye. "USP13 antagonizes gp78 to maintain functionality of a chaperone in ER-associated degradation." (2014) Elife 3:e01369. Epub Jan 14th. PMID: 24424410.
6. Kyoung-Soon Jang, Michael Sweredoski, Robert Graham, Sonja Hess & William Clemons, Jr. "Comprehensive proteomic profiling of outer membrane vesicles from *Campylobacter jejuni*." J Proteomics (2014) v96 pp90-8. Epub Dec. 29th, 2013. PMID: 24382552.
7. Sureshkumar Ramasamy, Ravinder Abrol, Christian Suloway & William Clemons, Jr. "The glove-like structure of the conserved membrane protein TatC provides insight into signal sequence recognition in twin-arginine translocation." Structure (2013) v21 n5 pp777-88. Epub Apr. 9th. PMID: 23583035.
8. Michael Rome, Meera Rao, William Clemons, Jr. & Shu-ou Shan "Precise timing of ATPase activation drives targeting of tail-anchored proteins." PNAS (2013) v110 n19 pp7666-71. Epub Apr. 22nd. PMID: 23610396.
9. Justin Chartron, David Vandervelde, William Clemons, Jr. "Structures of the Sgt2/SGTA dimerization domain with the Get5/UBL4A UBL domain reveal an interaction that forms a conserved dynamic interface." Cell Reports (2012) v2 n6 pp1620-32. Epub Nov 8th, 2012. PMID: 23142665.
10. Shiho Tanaka and William Clemons, Jr. Minimal requirements for inhibition of MraY by lysis protein E from bacteriophage ΦX174. Mol Microbiol (2012) v85 n5 pp975-85. Epub Jul 13th. PMID: 22742425
11. Justin Chartron, William Clemons, Jr. and Christian Suloway. "The complex process of GETting tail-anchored proteins to the membrane. (REVIEW)" Curr Op Struct Biol (2012) v22 n2 pp217-24 Epub Mar 21st. PMID:22444563
12. Justin Chartron, David Vandervelde, Michael Rao and William Clemons, Jr. "The Get5 carboxyl terminal domain is a novel dimerization motif that tethers an extended Get4/Get5 complex." J Biol Chem (2012) v287 n11 pp8310-7 Epub Jan 17th. PMID: 22262836
13. Christian Suloway, Michael Rome, William Clemons, Jr. "Tail-anchor targeting by a Get3 tetramer: the structure of an archaeal homologue." EMBO J (2012) v31 n3 pp707-19. Epub Nov 29th, 2011. PMID: 22124326
14. Justin Chartron, Grecia Gonzalez and William Clemons, Jr. "A structural model of Sgt2 and its interactions with chaperones and Get4/Get5." J Biol Chem (2011) 286(39):34325-34. *Epub* Aug 10th. PMID: 20554915
15. Justin Chartron, Christian Suloway, Ma'ayan Zaslaver and William Clemons, Jr. "Structural characterization of the Get4/Get5 complex and its interaction with Get3." PNAS (2010) 107(27):12127-32 *Epub* June 16th. PMID: 20554915
16. Christian Suloway, Justin Chartron, Ma'ayan Zaslaver and William Clemons, Jr. "Model for eukaryotic tail-anchored protein binding based on the structure of Get3." PNAS (2009) v106 n35 pp14849-54. Online August 14. PMID:19706470
17. Suresh Ramasamy and William Clemons, Jr. "Structure of the twin-arginine signal binding protein DmsD from *Escherichia coli*." Acta Cryst F (2009) v65 n8 pp746-50.
—**The following publications are work prior to Caltech**—
18. Jean-Francois Ménétret, Julia Schaletzky, William Clemons, Jr., Andrew Osborne, Sigrid Skånland, Carilee Denison, Stephen Gygi, Steven Ludtke, Tom Rapoport and Christopher Akey. "Ribosome binding of a single copy of the SecY complex:

- implications for the initiation of protein translocation.” Mol Cell (2007) v28 n6 pp1083-92.
19. Margaret Smith, William Clemons, Jr., Catherine DeMars, Ann Flower. “Modeling the effects of *prl* mutations on the *Escherichia coli* SecY complex” (2005) J Bact v187 n18 pp6454-65.
 20. Kurt Cannon, Eran Or, William Clemons, Jr., Yoko Shibata, and Tom Rapoport. “Disulfide bridge formation between SecY and a translocating polypeptide localizes the translocation pore to the center of SecY.” (2005) J Cell Biol v169 n2 pp219-25.
 21. William Clemons, Jr., Jean-François Ménétre, Christopher Akey, and Tom Rapoport. “Structural insight into the protein translocation channel (REVIEW).” (2004) Curr Op Struct Biol v14 n4 pp390-6.
 22. Andrew Osborne, William Clemons, Jr., Tom Rapoport. “A large conformational change of the translocation ATPase SecA.” (2004) PNAS v101 n30 pp10937-42.
 23. Bert van den Berg, Paul Black, William Clemons, Jr., and Tom Rapoport. “Crystal structure of the long-chain fatty acid transporter FadL.” (2004) Science v304 n5676 pp1506-9.
 24. Bert van den Berg*, William Clemons, Jr.*, Ian Collinson, Yorgo Modis, Enno Hartmann, Stephen Harrison, and Tom Rapoport. “X-ray structure of a protein conducting channel.”(2004) Nature v427 n6969 pp36-44.
 25. Ditlev Brodersen, William Clemons, Jr., Andrew Carter, Brian Wimberly, and Venki Ramakrishnan. “Phasing the 30S ribosomal subunit structure.” (2003) Acta Cryst D D59 Pt 11 pp2044-50.
 26. Ditlev Brodersen, William Clemons, Jr., Andrew Carter, Brian Wimberly, and Venki Ramakrishnan. “Crystal structure of the 30S ribosomal Subunit from *Thermus thermophilus*. Structure of the proteins and their interactions with 16S RNA.” (2002) J Mol Biol v316 n3 pp725-68.
 27. William Clemons, Jr., Ditlev Brodersen, John McCutcheon, Joanna May, Brian Wimberly, Andrew Carter, Robert Morgan-Warren, and Venki Ramakrishnan. “Crystal structure of the 30S ribosomal subunit from *Thermus thermophilus* I. Purification, crystallization and structure determination.” (2001) J Mol Biol v310 n4 pp827-43.
 28. James Ogle, Ditlev Brodersen, William Clemons, Jr., Michael Tarry, Andrew Carter, and Venki Ramakrishnan. “Recognition of cognate transfer RNA by the 30S ribosomal subunit.” (2001) Science v292 n5518 pp897-902.
 29. Andrew Carter, William Clemons, Jr., Ditlev Brodersen, Robert Morgan-Warren, Thomas Hartsch, Brian Wimberly and Venki Ramakrishnan. “Crystal structure of an initiation factor bound to the 30S ribosomal subunit.” (2001) Science v291 n5503 pp498-501.
 30. Ditlev Brodersen, William Clemons, Jr., Andrew Carter, Robert Morgan-Warren, Brian Wimberly & Venki Ramakrishnan. “The structural basis for the action of the antibiotics tetracycline, pactamycin, and hygromycin B on the 30S ribosomal subunit.”(2000) Cell v103 n7 pp1143-54.
 31. Brian Wimberly*, Ditlev Brodersen*, William Clemons, Jr.*, Robert Morgan-Warren*, Andrew Carter*, Clemens Vonrhein, Thomas Hartsch, & Venki Ramakrishnan. "The Structure of the 30S Ribosomal Subunit.” (2000) Nature v407 n6802 pp327-39.
 32. Andrew Carter*, William Clemons, Jr.*, Ditlev Brodersen*, Robert Morgan-Warren, Brian Wimberly, & Venki Ramakrishnan. “Functional insights from the structure of the 30S ribosomal subunit and its interactions with antibiotics.” (2000) Nature v407 n6802 pp340-8.
 33. Peter Allard, Alexey Rak, Brian Wimberly, William Clemons, Jr., Alexander Kalinin, Magnus Helgstrand, Maria Garber, Venki Ramakrishnan, & Torleif Härd. “Another piece

- of the ribosome: solution structure of S16 and its location in the 30S subunit.” (2000) Structure. v8 n8 pp875-82.
34. Venki Ramakrishnan, Malcolm Capel, William Clemons, Jr., Joanna May, Brian Wimberly. “Progress toward the crystal structure of a bacterial 30S ribosomal subunit.” (2000) In Garrett et al (eds). The Ribosome ASM Press, Washington D.C. pp3-10.
 35. Stephen White, William Clemons Jr., Christopher Davies, Venki Ramakrishnan, & Brian Wimberly. “Structures of bacterial ribosomal proteins: High resolution probes of the architecture and mechanism of the ribosome.” (2000) In Garrett et al (eds). The Ribosome ASM Press, Washington D.C. pp66-72.
 36. William Clemons Jr, Krishne Gowda, Shaun Black, Christian Zweib, & Venki Ramakrishnan. “Crystal structure of the conserved subdomain of human protein SRP54m at 2.1Å resolution: Evidence for the mechanism of signal peptide binding.” J Mol Biol (1999) v292 n3 pp697-705.
 37. William Clemons Jr.*, Joanna May*, Brian Wimberly*, John McCutcheon, Malcolm Capel, & Venki Ramakrishnan. “Structure of a bacterial 30S ribosomal subunit at 5.5Å resolution.” (1999) Nature. v400 n6747 pp833-40.
 38. Krishne Gowda, William Clemons Jr., Shaun Black, & Christian Zweib. “Expression, purification, & crystallography of the conserved methionine-rich domain of human signal recognition particle 54kDa protein.” (1999) Protein Sci v8 n5 pp1144-51.
 39. John McCutcheon, Rajendra Agrawal, Shibu Philips, Robert Grassucci, Sue Ellen Gerchman, William Clemons Jr., Venki Ramakrishnan, & Joachim Frank. “Location of translational initiation factor IF3 on the small ribosomal subunit.” (1999) PNAS. v96 n8 pp4301-6.
 40. William Clemons Jr., Christopher Davies, Steven White, & Venki Ramakrishnan. “Conformational variability of an N-terminal helix in the structure of ribosomal protein S15”, (1998) Structure v6 n4 pp429-38.
- * denotes equal contribution

Manuscripts in preparation

Kyoung-Soon Jang, Roger Nani, Sergiy Levin, Michael Sweredoski, Sonja Hess, Sarah Reisman & William Clemons, Jr. “A versatile enrichment tool for glycomics and glycoproteomics: a cationic hydrazide-functionalized resin.” (2013b)

Patents

Ditlev Brodersen, Andrew Carter, William Clemons, Jr., Venki Ramakrishnan, Brian Wimberly. “Crystal Structure of the 30S Subunit and Its Use.” US Patent 20020106660, GB Patents 0017376.5 and 0022943.5.

William Clemons, Jr., Kyoung-soon Jang, Sergiy Levin, Roger Nani and Sarah Reisman. “Cysteine Hydrazide Nicotinamide for Glycomics and Glycoproteomics Studies.” Provisional patent CIT-6302-P2

Teaching

BMB202abc: Biochemistry Seminar Course 2010 – Current

BMB170abc: Biochemistry and biophysics of macromolecules and molecular assemblies 2008 – current

BMB170: Principles of three-dimensional protein structure 2006 & 2007

Service

Internal

BMB Option Representative (2013 – Present)

Admissions/GSC for BMB option (2006 - present)
GSC for Chemistry option (2011 – present)
GSC for Caltech (2013 – present)
Student Life and Housing Committee (2013 – Present)
3 Faculty search committees (Andre Hoelz and Mitch Guttman)
Biochemistry seminar organizer (2007 – present)
Molecular Observatory advisory committee

External

Editorial Board for Cell Reports (2012 – present)
Editorial Board for Journal of Biological Chemistry (2014 – present)
Reviewer: *Acta Cryst D, Biochemistry, Biochem J, BioEssays, Cell, Cell Reports, Current Biology, eLife, EMBO J, J Cell Biol, JACS, JMB, Mol Biol Cell, Mol Cell Phys, NSMB, PLoS Biology, PNAS, Structure* and grants for the UK BBSRC.
ASBMB 2012 Annual Meeting Organizing Committee, 2011-2012
NIH Study Section, Macromolecular Structure and Function C, June 2012, *ad hoc*
NIH Study Section, Membrane Biology and Protein Processing, February 2012, *ad hoc*
NIH reviewer, Program Project Grant for NIAID 2014, *ad hoc*

Scientific Presentations (Selected)

Miami University, Oxford, IL, 2014
GRC Protein Transport Across Membranes Galveston, TX, 2014, Presenter
Northwestern University, Evanston, IL, 2013
University of Chicago, Chicago, IL, 2013
University of California, Irvine, CA, 2013
University of Virginia, Charlottesville, VA, 2013
University of Maryland, Baltimore County, MD, 2013
Johns Hopkins University School of Medicine, Baltimore, MD, 2013
Massachusetts Institute of Technology, Cambridge, MA, 2013
Laboratory of Molecular Biology, Cambridge, United Kingdom, 2013
Oxford University, Oxford, United Kingdom, 2013
Imperial College, London, United Kingdom, 2013
Stanford University, Palo Alto, CA, 2013
Yale University, New Haven, CT, 2013
GRC Glycobiology, Ventura, CA, 2013, Poster
City College New York, NY, 2013
The Scripps Research Institute, San Diego, CA, 2013
Weill Cornell Medical, New York, NY, 2012
Protein Society Annual Meeting, San Diego, CA, 2012
University of San Diego, San Diego, CA, 2012
ASBMB Annual Meeting, San Diego, CA, 2012
National Institutes of Health, Bethesda, MD, 2012
GRC Protein Transport Across Membranes Galveston, TX, 2012, Poster
University of California at Los Angeles, Los Angeles, CA, 2012
University of Wisconsin, Madison, WI, 2011
University of California at Berkeley, Berkeley, CA, 2011
Texas A&M, College Station, TX, 2010
University of Toronto, Ontario, Canada, 2010
GRC Protein Transport Across Membranes Galveston, TX, 2010
Stockholm University, Sweden, 2009
Calstate University, Los Angeles, 2009
University of Colorado, Boulder, 2009

Protein Society Annual Meeting Proteins in Motion, Boston, 2009
GRC Proteins, New Hampshire, 2007
8th International School of Crystallography, MAX/INF, Como, Italy, 2006
Carlsberg Research Center, Copenhagen, Denmark, 2005
Stockholm University, Stockholm, Sweden, 2005
Århus University, Århus, Denmark, 2005
11th DRDC-IBS Workshop, Autrans, France, 2005
University of Maryland, Baltimore County, MD 2004
University of Utah, Salt Lake City, UT 2004
American Crystallographic Association, Chicago, IL 2004
GRC, Endocytosis and Lysosomes, NH 2004
Keystone Symposia, Frontiers in Structural Biology, Snowbird, UT 2004
Vertex Pharmaceuticals Inc., Cambridge, MA 2002
Pfizer Inc., Groton, CT 2002
Daresbury Laboratories, Daresbury, United Kingdom 2001
RNA Society of Cambridge, Cambridge, United Kingdom 2001
3rd Cell Biology Symposium on Protein Transport and Stability, Berlin, Germany 2001
Rockefeller University, New York City, NY 2000

Lab Members

Current members:

Hyun Gi Yun, Grad Student, Chemistry, 2013
Stephen Marshall, Grad Student, Chemistry, 2013
Eugene Chun, Ph.D. The Scripps Research Institute, Post-Doc, 2012
Geoffrey Lin, Ph.D. National Tsinghua Univ., Post-Doc, 2012
Lada Klačic, Ph.D. Northwestern Univ., 2012
Axel Müller, Ph.D. York Univ., Staff Scientist, 2011
Amanda Jee-Young Mock, Grad Student, BMB Program, 2011
Harry Gristick, Grad Student, BMB Program, 2009

Former members:

Vijay Somalinga, Post-Doc, 2012-14
Katrine Museth, Research Technician, 2011-14
Shiho Tanaka, Post-Doc, 2010-14, Senior Scientist, ADXr, Thousand Oaks, CA
Kyoung-Soon Jang, Post-Doc, 2010-13, Senior Researcher, Korean Basic Science Institute
Ma'ayan Zaslaver, Research Technician, 2007-2012
Suresh Kumar Ramasamy, Staff Scientist, 2006-2012, Asst. Prof., NCL-Pune, India
Justin Chartron, Grad Student, BMB Program, 2006-2012, Post-Doc at Stanford
Christian Suloway, Grad Student, Biology, 2006 – 2012, Post-Doc at Northwestern
Alice Chen, Research Technician, 2011
Doreen Chen, Undergraduate, Caltech, 2012
Jacklyn Maslyn, Undergraduate, Caltech, 2012
Tinyi Chu, Hong Kong Undergraduate Research Fellow, 2011
Jaeyoon Chung, Volunteer, Caltech, Chemistry, 2011
Katherine Brugman, SURF student, UC Berkeley, 2011
Anastasia Zinchenko, Diplom Student, Univ of Saarbrücken, German, 2011
Tamara Stegmenn, Diplom student, Univ of Utrecht, The Netherlands, 2011
Grecia Gonzalez, MURF Student, Harvard Univ, 2010
David Machejewski, Amgen Scholar, Boston College, 2010
Jennifer Timm, Diplom Student, Univ of Konstanz, Germany, 2009 – 2010
Yuko Tsutsui, Post-Doc, Case Western Univ, 2007 – 2011

Axel Müller, Post-Doc, York Univ, 2006 – 2011
Nadia Iqbal, Undergrad, Bioengineering, 2009 – 2011
Alan Deng, Undergrad, Chemistry, 2009
Yee-ra Jo, Undergrad, Biology, 2009
Grace Wu, Amgen Scholar, Univ of Chicago, 2009
Caroline Nguyen, High School Student, 2008
Christine Hanna, MURF Program, Summer 2008
Kangway Chuang, Undergrad, Chemistry, 2008
Tom Lampo, Undergrad, Chemical Engineering, Caltech 2008
Damien Soghoian, Undergrad, Biology, 2006 – 2008
Sunny Chun, Undergrad, Chemistry, 2006 - 2008
Matt Thornton, Research Technician, 2006 - 2007
Alison Glazier, Post-Doc, Caltech 2006
Monique Hall, MURF Program, Caltech, Summer 2006