Nathan N. Alder, Ph.D.

Personal Information

Citizenship: U.S.

Address: Department of Molecular and Cell Biology

University of Connecticut

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Storrs, CT 06269-3125

<u>Telephone</u>: (860) 486-5154 Fax: (860) 486-4331

E-mail: nathan.alder@uconn.edu

Education and Training

· Postdoctoral Research Associate,

Texas A&M University Health Science Center College Station, TX

Program: Biochemistry / Biophysics

Postdoctoral Advisor: Arthur E. Johnson, Ph.D.

Ph.D., University of California, Davis
 Program of study: Plant Biology / Biophysics
 GPA 4.00

Graduate Advisor: Steven M. Theg, Ph.D.

Dissertation Title: "Analysis of the Energetics and Kinetics of Protein Transport via the

∆pH-Dependent/cpTat Pathway in Thylakoids"

Ph.D. conferred June 2002

• B.S., University of Utah Salt Lake City, UT

Program of study: Biology GPA 3.73

B.S. September 1994

Professional Experience

Research

• Program Head: Structural Biology, Biophysics and September 2016 – Present

Biochemistry (SB³) Area of Concentration Department of Cell and Molecular Biology

University of Connecticut

Associate Professor
 April 2014 – Present

Department of Cell and Molecular Biology University of Connecticut

Offiversity of Confidential

• Assistant Professor August 2008 – April 2014

Department of Cell and Molecular Biology

University of Connecticut

• Assistant Research Scientist June 2006 – August 2008

Texas A&M University

Principal Investigator: Arthur E. Johnson, Ph.D.

• Postdoctoral Research Associate September 2001 – June 2006

Texas A&M University

Principal Investigator: Arthur E. Johnson, Ph.D.

• Graduate Research Assistant June 1997 – September 2001

University of California, Davis

Principal Investigator: Steven M. Theg, Ph.D.

Laboratory Technician
 July 1994 – July 1996

University of Utah

Principal Investigator: John S. Sperry, Ph.D.

Professional Experience (Cont.)

Teaching

 Course Instructor August 2008 – Present

University of Connecticut, Department of Molecular and Cell Biology Biochemistry (MCB 3010/5001); Introduction to Translational Research (MCB 3100 Honors);

Structure and Function of Biological Membranes (MCB 5025);

Foundations of Structural Biochemistry (MCB 5012)

• Workshop Co-instructor "Fluorescence Theory and Applications"

Texas A&M Institute of Biosciences and Technology, Houston, TX

 Teaching Assistant, Introductory Biochemistry University of California, Davis

• Teaching Assistant, Mineral Nutrition of Plants University of California, Davis

• Teaching Assistant, Introductory Biology University of Utah

May 2003

April 2000 - July 2000

April 1998 - July 1998

June 1992 – June 1993

Research Funding

Grants Awarded

• National Institutes of Health R01 (RGM113092A); "Investigation of the Subunit and Lipid Interactions of the Mitochondrial Protein Import Machinery"; \$1,487,892 (\$950,000 Direct); PI: Nathan Alder

December 2014 -December 2019

• Barth Syndrome Foundation Research Grant; "Investigation of Cardiolipin-Dependent Respiratory Complex Activity and Development of Small Molecule Lipid Analogs"; \$50,000; PI: Nathan Alder

May 2014 - May 2017

• National Science Foundation (MCB-1330695); "Functional Dynamics and Energy Coupling Mechanisms of Mitochondrial Membrane Proteins": \$421,426 (\$274,759 Direct); PI: Nathan Alder

September 2013 -September 2016

• National Science Foundation (MCB-1024908); "Fluorescence-Based Investigation of the Structure and Functional Dynamics of the Mitochondrial Protein Import Machinery"; \$788,905 Total costs (\$582,557 Direct); PI: Nathan Alder

July 2010 - July 2014

 American Heart Association; Scientist Development Grant (09SDG2380019); "Fluorescence-Based Study of the Mitochondrial Adenine Nucleotide Translocase: A Key Component in Heart Disease" \$308,000 Total costs (\$280,000 Direct); PI: Nathan Alder

July 2009 - July 2014

•UCHC and Storrs/Regional Campus Incentive Grant (UCIG) "Monitoring effects of cancer-associated mutations on conformation dynamics of DNA mismatch repair proteins"; \$100,000 Total costs; co-PI: Chris Heinen

July 2012 - July 2014

Research Funding (Cont.)

Support from Philanthropic Organizations

• Social Profit Network Fund for Mitochondrial Research This Program Fund was established for research in Dr. Alder's lab for mitochondrial research and for the development and analysis of novel therapeutic compounds for mitochondrial and ageing-related diseases. December 2016-present (ongoing support)

Publications

Published Manuscripts

Calzada, E., Avery, E., Sam, P.N., Modak, A., Wang, C., McCaffery, J.M., Han, X., **Alder, N.N.**, and Claypool, S.M. (2019). Phosphatidylethanolamine made in the inner mitochondrial membrane is essential for yeast cytochrome *bc*₁ complex function. *Nature Communications* 10:1432.

Boyd, K.J., **Alder, N.N.**, and May, E.R. (2018). Molecular dynamics analysis of cardiolipin and monolysocardiolipin on bilayer properties. *Biophysical Journal* 114: 2116-2127.

Malhotra, K., Daman, T., Nangia, S., Modak, A., Robinson, V.L., May, E.R., Mokranjac, D., and **Alder, N.N.** (2017). Cardiolipin mediates membrane and channel interactions of the mitochondrial TIM23 protein import complex receptor Tim50. *Science Advances* 3(9)e1700532.

Boyd, K.J., **Alder, N.N.**, and May, E.R. (2017). Buckling under pressure: curvature based lipid segregation and stability modulation in cardiolipin containing bilayers. *Langmuir* 33: 6937-6946.

Malhotra, K., and **Alder, N.N.** (2017). Reconstitution of mitochondrial membrane proteins into nanodiscs by cell-free expression. *Methods in Molecular Biology* 1567: 155-178.

Sathappa, M., and **Alder, N.N.** (2016). Ionizaion properties of phospholipids determined by zeta potential measurements. *BioProtocols* 6(22).

Sathappa, M., and **Alder, N.N.** (2016). The ionization properties of cardiolipin and its variants in model bilayers. *Biochimica et Biophysica Acta – Biomembranes* 1858: 1362-1372.

Lee, K.K., Imaizumi, N., Chamberland, S.R., **Alder, N.N.**, and Boelsterli, UA. (2015). Targeting mitochondria with methylene blue protects mice against acetaminophen-induced liver injury. *Hepatology* 61: 326-336.

Malhotra, K. and **Alder, N.N.** (2014). Advances in the use of nanoscale bilayers to study membrane protein structure and function. *Biotechnology and Genetic Engineering Reviews* 30:79-93.

Hwang, M.S., Schwall, C.T., Pazarentos, E., Datler, C., **Alder, N.N.**, and Grimm, S. (2014). Mitochondrial Ca²⁺ influx targets cardiolipin to disintegrate respiratory chain complex II for cell death induction. *Cell Death and Differentiation* 21: 1733-1745.

Baile, M.G., Sathappa, M., Lu, Y.W., Pryce, E., Whited, K., McCaffery, J.M., Han, X., **Alder, N.N.**, and Claypool, S.M. (2014). Unremodeled and remodeled cardiolipin are functionally indistinguishable in yeast. *Journal of Biological Chemistry* 289: 1768-1778.

Lee, K.K., Fujimoto, K., Zhang, C., Schwall, C.T., **Alder, N.N.**, Pinkert, C.A., Krueger, W., Rasmussen, T., and Boelsterli, U.A. (2013). Isoniazid-induced cell death is precipitated by underlying mitochondrial complex I dysfunction in mouse hepatocytes. *Free Radical Biology and Medicine* 65: 584-594.

Publications (Cont.)

- Malhotra, K., Sathappa, M., Landin, J.S., Johnson, A.E., and **Alder, N.N.** (2013). Structural changes in the mitochondrial Tim23 channel are coupled to the proton-motive force. *Nature Structural and Molecular Biology* 20: 965-972.
- Schwall, C.S. and **Alder, N.N.** (2013). Site-specific fluorescent probe labeling of mitochondrial membrane proteins. *Methods in Molecular Biology* 1033: 103-120.
- Long, A.R., O'Brien, C.C., Malhotra, K., Schwall, C.T., Albert, A.D., Watts, A., and **Alder, N.N.** (2013). A detergent-free strategy for the reconstitution of active enzyme complexes from native biological membranes into nanoscale discs. *BMC Biotechnology* 13(1):41.
- Long, A.R., O'Brien, C.C., and **Alder, N.N.** (2012). The cell-free integration of a polytopic mitochondrial membrane protein into liposomes occurs cotranslationally and in a lipid-dependent manner. **PLoS ONE** 7: e46332 doi: 10.1371/journal.pone.0046332.
- Schwall, C.T., Greenwood, V.L., and **Alder, N.N.** (2012). The stability and activity of respiratory Complex II is cardiolipin-dependent. *Biochimica et Biophysica Acta Bioenergetics* 1817: 1588-1596.
- Ranaghan, M.J., Schwall, C.T., **Alder, N.N.**, and Birge, R.R. (2011). Green proteorhodopsin reconstituted into nanoscale phospholipid bilayers (nanodiscs) as active monomers. *Journal of the American Chemical Society* 133: 18318-18327.
- Deshmukh, L., Meller, N., **Alder, N.N.**, Byzova, T., and Vinogradova, O. (2011). Tyrosine phosphorylation as a conformational switch: a case study of integrin $\beta 3$ cytoplasmic tail. **Journal of Biological Chemistry** 286: 40943-40953...
- Jha, S., Patil, S.M., Gibson, J., Nelson, C.E., **Alder, N.N.**, and Alexandrescu, A.T. (2011). Mechanism of amylin fibrilization enhancement by heparin. *Journal of Biological Chemistry* 286: 22894-22904.
- **Alder, N.N.**, Jensen, R.E., and Johnson, A.E. (2008). Fluorescence mapping of mitochondrial TIM23 complex reveals a water-facing, substrate-interacting helix surface. *Cell* 134: 439-450.
- **Alder, N.N.**, Sutherland, J., Buhring, A.I., Jensen, R.E., and Johnson A.E. (2008). Quaternary structure of the mitochondrial TIM23 complex reveals dynamic association between Tim23p and other subunits. *Molecular Biology of the Cell* 19: 159-170.
- Davis, A.J., **Alder, N.N.**, Jensen, R.E., and Johnson, A.E. (2007). The Tim9p/10p and Tim8p/13p complexes bind to specific sites on Tim23p during mitochondrial protein import. **Molecular Biology of the Cell** 18: 475-486.
- **Alder, N.N.**, Shen, Y., Brodsky, J.L., Hendershot, L.M., and Johnson, A.E. (2005). The molecular mechanisms underlying BiP-mediated gating of the Sec61 translocon of the endoplasmic reticulum. *The Journal of Cell Biology* 168: 389-399.
- **Alder, N.N.** and Johnson, A.E. (2004). Cotranslational membrane protein biogenesis at the endoplasmic reticulum. *The Journal of Biological Chemistry* 279: 22787-22790.
- **Alder, N.N.** and Theg, S.M. (2003). Energetics of protein transport across biological membranes: a study of the thylakoid ΔpH/cpTat pathway. *Cell* 112: 231-242.
- **Alder, N.N.** and Theg, S.M. (2003). Protein transport *via* the cpTat pathway displays cooperativity and is stimulated by transport-incompetent substrate. *FEBS Letters* 540: 96-100.
- **Alder, N.N.** and Theg, S.M. (2003). Energy use by biological protein transport pathways. *Trends in Biochemical Sciences* 28: 442-451.

Publications (Cont.)

Donovan, L.A., Grise, D.J., West, R.A., **Alder, N.N.**, and Richards, J.H. (1999). Predawn disequilibrium between plant and soil water potentials. *Oecologia* 120: 209-217.

Alder, N.N., Pockman, W.T., Nuismer, S., and Sperry, J.S. (1997). Use of centrifugal force in the study of xylem cavitation. *Journal of Experimental Botany* 48: 665-674.

Alder, N.N., Sperry, J.S., and Pockman, W.T. (1996). Root and stem xylem embolism, stomatal conductance, and leaf turgor in *Acer grandidentatum* populations along a soil moisture gradient. *Oecologia*, 105: 293-301.

Alder, N.N., and Eastlack, S.E., and Sperry, J.S. (1993). The effect of reduced hydraulic conductance on stomatal conductance and xylem cavitation. *Journal of Experimental Botany* 44, 1075-1082.

Submitted Manuscripts and Invited Chapters/Reviews

Bae, M., Lee, Y., Pham, T.X., Park, Y.-K., Hu, S., Shin, D.-G., Joshi, P., Hong, S.-H., **Alder, N.N.**, Koo, S.I., and Lee, J.-Y. Hepatic stellate cells have distinct metabotypes depending on their activation states: Modulation of hepatic stellate cell metabotypes by astaxanthin during activation. *Under review in Journal of Nutritional Biochemistry*.

Book Chapters

Alder, N.N. (2019) "Fluorescence spectroscopy and its applications in biomolecular research" In: *Biomolecular and Bioanalytical Techniques: Theory, Methodology and Applications* (Ramesh, V., ed.) Wiley, U.K.

Alder, N.N. (2011). "Biogenesis of Lipids and Proteins within Mitochondrial Membranes" In: *The Structure of Biological Membranes* (Yeagle, P., ed), Third edition, pp. 315-377. CRC Press, New York.

Havrilla, M.E., **Alder, N.N.**, and Theg, S.M. (1998). "Protein Transport and Assembly in Thylakoids". In: *Photosynthesis: Mechanisms and Effects* (Garab, G., ed.) Vol. II, pp. 1443-1446. Kluwer Academic Publishers, The Netherlands.

Textbooks

"Biomembranes: A Quantitative Approach" (Garland Scientific). In preparation.

Scientific Presentations

Invited Speaker

- Barth Syndrome Foundation 9th International SCIMED Conference, Clearwater, FL July 2018
- Biomedical and Translational Sciences Department Seminar Series, Rowan University, Glassboro, NJ, November 2017
- Department of Nutritional Sciences Seminar Series, University of Connecticut, Storrs, CT, October 2017.
- Symposium, "Cardiolipin as a Key Lipid of Mitochondria in Health and Disease", Bari, Italy, October 2017.
- Department of Biochemistry & Cellular and Molecular Biology Seminar Series, University of Tennessee, Knoxville, TN, April 2017.
- Lipids@Wayne Seminar Series, Wayne State University, Detroit, MI, February 2017
- Barth Syndrome Foundation 8th International SCIMED Conference, Clearwater, FL, July 2016
- Department of Biochemistry Seminar Series, University of Illinois, Urbana-Champaign, April, 2016
- UCLA Chemistry and Biochemistry Seminar Series, Los Angeles, CA, February 2016
- UConn Health Molecular Biology and Biochemistry Seminar Series, Farmington, CT, December 2015
- Gordon Research Conference on Bioenergetics, Andover, NH, June 2015.
- Department of Biochemistry and Redox Biology Center, University of Nebraska, Lincoln, NE, April 2015.
- EMBO Conference, Mechanisms and Regulation of Protein Translocation", Dubrovnik, Croatia, March 2015.
- Biophysical Society Annual Meeting, Baltimore, MD, February 2015.
- Frankfurt Collaborative Research Consortium SFB-807 Transport and Communication across Biological Membranes Seminar Series, Frankfurt, Germany, January 2015.
- Animal Science Departmental Seminar Series, Department of Animal Sciences, University of Connecticut, Storrs, CT, December 2014.
- Gordon Research Conference on Protein Transport Across Cell Membranes, Galveston, TX, March 2014
- Medicinal Chemistry Seminar Series, Department of Pharmacy, University of Connecticut, Storrs CT, November, 2013.
- National Institutes of Health / NIDDK Seminar Series, Bethesda, MD, July 2013
- Miami University, Department of Chemistry and Biochemistry Lecture Series, Oxford, OH, October 2012.
- Johns Hopkins University School of Medicine, Physiology Lecture Series, Baltimore, MD, April 2012.
- Gordon Research Conference on Protein Transport Across Cell Membranes, Galveston, TX, March 2012
- Molecular and Cellular Biology Program Seminar Series, University of Massachusetts, Amherst, November 2011
- Keynote Lecture, University of Connecticut Health Center, Department of Molecular, Microbial and Structural Biology Retreat, Hartford, CT, May 2011
- FASEB Summer Research Conference on Mitochondria Assembly and Dynamics in Health and Disease, Carefree, AZ, July 2009
- Global-COE Symposium, Nagoya, Japan, March 2008
- Gordon Research Conference on Protein Transport Across Cell Membranes, Barga, Italy, June 2007
- Program in Membrane Structure and Function Symposium, Texas A&M University, January 2006
- Program in Membrane Structure and Function Symposium, Texas A&M University, January 2005
- American Society for Cell Biology Annual Conference, Washington DC, December 2004
- Biophysical Night Out Presentation, Texas A&M University, February 2004
- Center for Advanced Biomolecular Research Annual Conference, Navasota, TX, December 2002.
- National Science Foundation Plant Cell Biology Training Grant Retreat, Fallen Leaf Lake, CA, September 2000
- Molecular and Cellular Biology Training Grant Retreat, Fallen Leaf Lake, CA, October 1999

September 1988 to June 1992

Scientific Presentations (Cont.)

Contributed Presentations

- Biophysical Society Annual Meeting, New Orleans, LA, February 2017.
- Biophysical Society Annual Meeting, Los Angeles, CA, February 2016.
- American Society for Cell Biology Annual Conference, Philadelphia, PA, December 2014
- Biophysical Society Annual Meeting, San Francisco, CA, February 2014
- New England Structural Symposium Annual Conference, University of Connecticut, Storrs, CT, October 2013.
- Biophysical Society Annual Meeting, Philadelphia, PA, February 2013
- New England Structural Symposium Annual Conference, University of Connecticut Health Science Center, Farmington, CT, October 2012
- Gordon Research Conference on Protein Transport Across Cell Membranes, Galveston, Texas, March 2012
- American Society for Cell Biology Annual Conference, Denver, Colorado, December 2011
- Gordon Research Conference on Protein Transport Across Cell Membranes, Galveston, TX, March 2010
- Gordon Research Conference on Protein Transport Across Cell Membranes, Barga, Italy, June 2007
- Biophysical Society Annual Meeting, Salt Lake City, UT, February 2006
- European Science Foundation Conference on Protein Targeting, Spa, Belgium, September 2003: *This presentation received one of two first place awards.*
- American Society for Biochemistry and Molecular Biology Annual Conference, New Orleans, LA, April 2002
- American Society for Plant Physiology Annual Meeting, San Diego, CA, July 2000
- American Society of Microbiology Meeting on Macromolecular Transport Across Membranes, Savannah, GA, May, 2000
- Gordon Research Conference on Protons and Membrane Reactions, Ventura, CA, February 2000
- Western Conference on Photosynthesis, Asilomar, CA, January 1999

Seville Flowers Scholarship

Awards and Honors

 National Institutes of Health National Research Service Award, Postdoctoral Fellowship GM7026 	May 2004 – May 2006
National Science Foundation Graduate Research Fellowship	July 1997 – July 2000
Walter R. and Roselinde H. Russell	
Outstanding Graduate Student Fellowship	Received May 2001
Elsie Stocking Memorial Fellowship	Received September 2000
Jastro Shields Research Fellowship	July 1999 – September 2001
Pomology Department Research Assistantship	September 1996 – July 1997
Henry A. Jastro Fellowship	September 1996 – July 1997
Hughes Undergraduate Fellowship	September 1992 to June 1993
National Science Foundation REU Supplement	June 1992 to September 1992

Activities and Services

Research Mentorship

- Undergraduate research project mentor (ten undergraduate students; January 2009 to present)
- University Scholar Committee advisor (six undergraduates; Fall 2009 to present)
- Graduate student major advisor (four M.S. students and seven Ph.D. students; Fall 2009 to present)
- Graduate student associate advisor (20 students; Fall 2009 to present)

Professional Memberships

- American Association for the Advancement of Science
- The American Society for Cell Biology
- Biophysical Society

Membrane Structure and Assembly subgroup and Bioenergetics subgroup

Grant Proposal Review

- National Institutes of Health MBPP (Membrane Biology and Protein Processing) Study Section, *ad hoc* panelist, February 2015 and June 2018
- National Institutes of Health TAG (Therapeutic Approaches to Genetic Diseases) / SEP Study Section, ad hoc panelist, February 2017
- National Science Foundation Membrane Dynamics virtual panel, March 2014
- National Science Foundation Membrane Dynamics and Trafficking virtual panel, February 2015
- Barth Syndrome Foundation external grant reviewer, January 2017
- University of Connecticut Research Excellence Program (REP) grant panelist, April 2017
- Foundation for Polish Science, external grant reviewer, May 2017

Journal Reviewer (ad hoc reviewer)

- The Journal of Biological Chemistry
- Science Advances
- EMBO Reports
- Nature Protocols

- The Journal of Cell Biology
- Biochemistry
- Nano Research
- PLoS ONE

- The Journal of Molecular Biology
- BBA Biomembranes
- European Biophysics Journal
- BioTechniques

- European Journal of Heart Failure
- Journal of Agricultural and Food Chemistry
- The Journal of Bioenergetics and Biomembranes

Scientific Outreach

- Advanced Research Mentorship Program (Summer 2013 to present)
 - University instructors serve as mentors to high school students from regional schools in the development of a research proposal and a year-long research project conducted in the mentor's laboratory.
- University of Connecticut Early College Experience Biology Summer Institute (July 2012 to present)
 University instructors lead multiple series of classroom- and lab-based modular courses as a professional development institute for teachers and students from regional high schools.
- University of Connecticut Northeast Alliance Summer Outreach Program (Summer 2011)
 University instructors serve as mentors for minority undergraduates in the STEM fields form around the country in ten-week research programs that include research projects and professional development courses.
- Guest Lecturer in University of Connecticut Courses (Fall 2009 to present)
 Topics in Modern Biology (BIOL 1109); Introduction to Undergraduate Research (BIOL 2289);
 Human Disease and the Development of Therapeutic Agents (MCB 3022W); Advanced
 Biochemistry Laboratory (MCB 4026W); Introduction to Faculty Research (MCB 5899)

Activities and Services (Cont.)

Organization of Conferences and Scholarly Colloquia

- Co-Organizer, Research at the Interface of Chemistry and Biology: Joint symposium between Departments of Chemistry and of Molecular and Cell Biology. University of Connecticut, Storrs, April 2017.
- Discussion Leader, Gordon Research Conference on Protein Transport Across Cell Membranes, Galveston, TX, March 2018.
- Gordon Research Conference on Protein Transport Across Cell Membranes, Co-Chair Elect (March 2020) and Chair Elect (March 2022).
- ASBMB Annual Meeting 2020, Thematic Meeting Co-Organizer "Structure and Function of Molecular Machines", San Diego, CA, April 2020.

Departmental and University Service

Departmental Committees

MCB Course and Curriculum Committee (2009 to 2015)

MCB Graduate Recruitment Committee (2009 to 2015)

MCB Departmental Retreat Committee (2009 to 2015)

MCB Planning Committee (2011 to 2012)

Field of Study Reorganization Committee (Biochemistry representative, 2010 to 2011)

MCB Self-Study Committee (2015)

Chair, MCB Tenure Track Position Search Committee (2017, 2019)

MCB Promotion, Tenure and Reappointment Committee (2017)

MCB PhD Curriculum on Responsible Conduct in Research and Professional Development (2018)

University Committees

Member, University of Connecticut Radiation Safety Committee (2012 to 2015) Chair, University of Connecticut Radiation Safety Committee (2015 to present)

Press Releases and Media Coverage

- Press for Malhotra et al. (2013) Nature Structural and Molecular Biology 20: 965-972.
 - (i) Article highlighted as a News and Views "Voltage-coupled conformational dynamics of a mitochondrial protein-import channel" by N. Pfanner and colleagues in the same issue.
 - (ii) "Peering into the Protein Pathways of a Cell" in *UConn Today*, University of Connecticut, July 8, 2013.
 - (iii) Article highlighted in Science Daily, Biology News Net, PhysOrg, and EurekAlert!
- Press for receipt of UCIG grant

"UConn Scientists Team Up to Conduct New Cancer Research" in *UConn Today*, University of Connecticut, September 27, 2012.

• Press for Alder et al. (2008) Cell 134: 439-450.

Article highlighted as a Leading Edge Previews article "Gazing at Translocation in the Mitochondrion" by C. Koehler and colleagues in the same issue.

- Press for Alder et al. (2005) Journal of Cell Biology 168: 389-399
 - Article highlighted in J. Cell Biol (same issue) and in Nat. Struct. Mol. Biol. (Vol. 12, p. 217).
- Press for Alder and Theg (2013) Cell 112: 231-242.

Article highlighted in *Chemical and Engineering News* (Vol. 8, p. 50) and in *Trends in Plant Science* (Vol. 8, p. 360-363).