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**Nationality:** U.S.A.

**Education:** Stanford University, Stanford, California (1987-1993)  
Ph.D. Biochemistry  
Rice University, Houston, Texas (1983-1987)  
B.A. Biochemistry, *summa cum laude*

**Positions:** Arizona State University, Professor of Chem. & Biochem. (8/21/2014 – present)  
Director of the Center for Bioenergy and Photosynthesis (1/1/2015 – present)  
Arizona State University, Assoc. Prof. of Chem. & Biochem. (1/1/08 – 8/20/2014)  
Fulbright Research Scholar & Chercheur associé (CNRS), Institut de Biologie Physico-Chimique, Paris (8/15/07–7/20/08)  
University of Alabama, Associate Professor of Chemistry (8/16/04 – 12/30/07)  
University of Alabama, Assistant Professor of Chemistry (8/16/98 – 8/15/04)  
University of Geneva (Geneva, Switzerland), Maître-assistant in Plant Biol. Dept. (1998)  
N.S.F. Plant Biology Postdoctoral Fellow (1995-1997)  
Human Frontiers in Science Postdoctoral Fellow (1994)

**Honors and awards:** Secretary, International Society of Photosynthesis Research (2010-2016)  
Distinction of Merit and Scholastic Occupation Award, ASU DCB (2013)  
Fulbright Scholar (2008)  
U.A. College of Arts and Sciences Distinguished Teaching Fellow (2006-2007)  
Robin Hill Award (2004, International Society of Photosynthesis Research)  
N.S.F. CAREER award (2004-2009)  
DuPont Young Professor Award (1999 - 2002)  
N.S.F. Plant Biology Post-doctoral Fellowship (1995-1997)  
N.S.F. Pre-doctoral Fellowship (1987-1990)

**Languages:** English (native), French (fluent), Spanish (adequate)

**Ph.D. Advisor:** Robert S. Fuller  
current address: Department of Biological Chemistry, University of Michigan Med. Ctr.  
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**Postdoctoral Advisor:** Jean-David Rochaix  
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**Former graduate students:**

Syed Badshah (Biochemistry Ph.D., 2014), professor at the University of Peshawar (Pakistan)  
 Brent Boudreaux (Chemistry M.S., 2000, Outstanding Thesis Award),  
 currently at Delsite Biotechnologies, Inc (Dallas, Tx)  
 Bradford Bullock (Chemistry M.S., 2007), currently undecided  
 John Cowgill (Biochemistry, M.S., 2012), technician at U. Wisconsin  
 John Lee Franklin (Biol. Sci. M.S., 2001), currently at Univ. Alabama (Birmingham), Dept. of  
 Pathology  
 Christopher Gisriel (Biochemistry, Ph.D., 2017), currently a postdoctoral fellow at ASU  
 Feifei Gu (Chemistry Ph.D., 2005), died July 18, 2007, during her postdoc at U. Alabama  
 (Birmingham), Dept. of Physiology  
 Galina Gulis (Chemistry Ph.D., 2007), currently at Univ. Alabama, Dept. of Biol. Sci.  
 William Johnson (Biochemistry M.S., 2019), currently at UCLA  
 Julius Nathan Henderson (Chemistry M.S., 2002), currently postdoc at ASU (Wachter lab)  
 Trevor Kashey (Biochemistry Ph.D., 2015), currently employed by Olympic committee of  
 Azerbaijan  
 Yajing Li (Chemistry M.S., 2002), currently at Univ. Minnesota, School of Dentistry  
 Rajiv Luthra, currently an entrepreneur in India  
 Ramsey Nissan (Biochemistry, M.S., 2012), medical school (Grenada)  
 Kiera Reifschneider (Biochemistry, Ph.D., 2013), senior analyst at the U.S. Government  
 Accountability Office  
 Jianying Zhang (Chemistry Ph.D., 2007), currently at Case Western Univ.

**Former postdoctoral fellows:**

Dr. Tatyana Konovalova (EPR Facility Manager at U.A., co-funded with Dr. Lowell Kispert)  
 Alexander Petrenko (2001-2005), currently at Montana State University  
 Dr. Audrius Jasaitis (2005-2006), currently at the University of Florence, Italy  
 Dr. Michael McConnell (2011-2013), currently employed by Algenol  
 Dr. K.V. Narasimhulu (2005-2008), currently at the Univ. of Illinois EPR research Center  
 Dr. Stefano Santabarbara (2007-2009), permanent position at the C.N.R., Istituto di Biofisica,  
 Milano, Italy  
 Dr. Zahid Khan (2009-2010), professor at the University of Peshawar (Pakistan)  
 Dr. Iosifina Sarrou (2010-2012), currently in Athens, Greece  
 Dr. Marina Kozuleva (2014-2015), current at Inst. Basic Biol. Prob. (Pushchino, Russia)  
 Prof. Thummala Chandrasekhar (visiting 2014-2015), professor at Yogi Vemana Univ.

**Current graduate students:**

M.S. candidates:

Ph.D. candidates: Jesse Granstrom, Andrey Kanygin, Alexandria Layton

**Current postdoctoral fellows:** Gregory Orf**Current research funding:**

NSF (CBET-1706960) "Overcoming the Major Challenges to Algal Biohydrogen Production", \$401,123,  
 7/1/2017-6/30/2020

NASA (18-EXO18-0080; joint grant with Hilairy Hartnett, ASU) "Experimental tests for the origin and  
 evolution of anoxygenic photosynthesis", \$649,552, 4/1/2019-3/31/2022

DOE (DE-SC0010575; joint grant with John Golbeck, Penn. St. U.), "The Type I homodimeric reaction  
 center in *Heliobacterium modesticaldum*", \$1,256,638 (ASU share = \$781,638), 9/1/2019-8/31/2022

**Publications:**

1. Kanygin, A., Y. Milrad, C. Thummala, K.T. Reifschneider, P.L. Baker, P. Marco, I. Yacoby\* and K.E. Redding\*. (2019). Rewiring photosynthesis: a Photosystem I-hydrogenase fusion that makes H<sub>2</sub> *in vivo*. *Energy and Environmental Sciences*, in revision.
2. Johnson WA & Redding KE (2019) Reconstitution of the heliobacterial photochemical reaction center and cytochrome *c*<sub>553</sub> into a proteoliposome system. *Photosynth Res*. doi:10.1007/s11120-019-00695-w
3. Orf GS & Redding KE (2019) Expression and purification of affinity-tagged variants of the photochemical reaction center from *Heliobacterium modesticaldum*. *Photosynth Res* 142(3):335-348. doi:10.1007/s11120-019-00672-3
4. Baker PL, Orf GS, Kevershan K, Pyne ME, Bicer T, & Redding KE (2019) Using the Endogenous CRISPR-Cas System of *Heliobacterium modesticaldum* To Delete the Photochemical Reaction Center Core Subunit Gene. *Appl Environ Microbiol* 85(23). doi:10.1128/AEM.01644-19
5. Baker PL, Orf GS, Khan Z, Espinoza L, Leung S, Kevershan K, & Redding KE (2019) A Molecular Biology Tool Kit for the Phototrophic Firmicute *Heliobacterium modesticaldum*. *Appl Environ Microbiol* 85(19). doi:10.1128/AEM.01287-19
6. Orf, G.S., C. Gisriel, and K.E. Redding\*. (2018) Evolution of photosynthetic reaction centers: insights from the structure of the heliobacterial reaction center. *Photosynth Res* **138**:11-37.
7. Kashey, T., D.D. Luu, J.B. Cowgill, P.L. Baker, K.E. Redding\*. (2018) Light-driven quinone reduction in heliobacterial membranes. *Photosynth Res* **138**:1-9.
8. Giera W, Szewczyk S, McConnell MD, Redding KE, van Grondelle R, Gibasiewicz K (2018) Uphill energy transfer in photosystem I from *Chlamydomonas reinhardtii*. Time-resolved fluorescence measurements at 77 K. *Photosynth Res* **137**:321-335.
9. Sheehy D., Y.-K. Lu, F. Osman, Z. Alattar, C. Flores, H. Sussman, S. Zaare, M. Dooling, A. Meraban, P. Baker, J. Touchman, K.E. Redding\*. (2018). Genome-wide transcriptional response during the shift to N<sub>2</sub>-fixing conditions in *Heliobacterium modesticaldum*. *J. Proteomics Bioinformatics* **11**:143-160.
10. Marco P, Kozuleva M, Eilenberg H, Mazor Y, Gimeson P, Kanygin A, Redding K, Weiner I, Yacoby I (2018) Binding of ferredoxin to algal photosystem I involves a single binding site and is composed of two thermodynamically distinct events. *Biochim Biophys Acta* **1859**(4):234-243.
11. Badshah SL, Sun J, Mula S, Gorka M, Baker P, Luthra R, Lin S, van der Est A, Golbeck JH\*, Redding KE\* (2018) Mutations in algal and cyanobacterial Photosystem I that independently affect the yield of initial charge separation in the two electron transfer cofactor branches. *Biochim Biophys Acta* **1859**:42-55.
12. Govindjee, Redding K. (2017) Honoring Jean-David Rochaix. *Photosynth Res* **131**:221-225.
13. Gisriel, C., I. Sarrou, B. Ferlez, J.H. Golbeck, K.E. Redding, R. Fromme. (2017). Structure of a symmetric photosynthetic reaction center-photosystem. *Science* **357**:1021-1025.
14. Ferlez, B., Cowgill, J., Dong, W., Gisriel, C., Lin, S., Flores, M., Walters, K., Cetnar, D., Redding, K. E., and Golbeck, J. H. (2016) Thermodynamics of the Electron Acceptors in *Heliobacterium modesticaldum*: An Exemplar of an Early Homodimeric Type I Photosynthetic Reaction Center, *Biochem.* **55**:2358-2370.
15. Ferlez B, Dong W, Siavashi R, Redding K, Hou HJ, Golbeck JH, van der Est A (2015) The Effect of Bacteriochlorophyll *g* Oxidation on Energy and Electron Transfer in Reaction Centers from *Heliobacterium modesticaldum*. *J Phys Chem B*, **119**:13714-25.

16. Ort, D.R., S.S. Merchant, J. Alric, A. Barkan, R.E. Blankenship, R. Bock, R. Croce, M.R. Hanson, J.M. Hibberd, D.L. Lindstrom, S.P. Long, T.A. Moore, J. Moroney, K.K. Niyogi, M. Parry, P. Peralta-Yahya, R. Prince, K.E. Redding, M.H. Spalding, K. van Wijk, W.F.J. Vermaas, S. von Caemmerer, A.P.M. Weber, T. Yeates, J. Yuan, X. Zhu. (2015). Redesigning photosynthesis to sustainably meet global food and bioenergy demand. *Proc Natl Acad Sci USA* **112**:8529-36.
17. Yang, J.-H., Sarrou, I., Martin-Garcia, J.M., Zhang, S., Redding, K.E., Fromme, P. (2015). Purification and biochemical characterization of the ATP synthase from *Heliobacterium modesticaldum*. *Protein Expr Purif* **114**:1-8.
18. Santabarbara, S., B. Bullock, F. Rappaport, K.E. Redding. (2015). Controlling electron transfer between the two cofactor chains of Photosystem I by the redox state of one of their components. *Biophys. J.* **108**:1537-47.
19. McConnell, M.D., J. Sun, R. Siavashi, A.N. Webber, K.E. Redding, J.H. Golbeck, and A. van der Est. (2015). Species Dependent Alteration of Electron Transfer in Photosystem I. *Biochim. Biophys. Acta.* **1847**:429-40.
20. McConnell, M.D., D. Lowry, T.N. Rowan, K. van Dijk and K.E. Redding. (2014). Purification and photobiochemical profile of photosystem 1 from high-salt tolerant, oleaginous *Chlorella* (Trebouxiophyceae, Chlorophyta). *Biochem. & Cell Biol.* **93**:199-209.
21. Giera, W., S. Szewczyk, M.D. McConnell, J. Snellenburg, K.E. Redding, R. van Grondelle, K. Gibasiewicz. (2014). Excitation dynamics in Photosystem I from *Chlamydomonas reinhardtii*. Comparative studies of isolated complexes and whole cells. *Biochem. Biophys. Acta* **1837**:1756-1768.
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23. Reifschneider-Wegner\*, K.T., A. Kanygin, and K.E. Redding\*. (2014). Expression of the [FeFe] hydrogenase in the chloroplast of *Chlamydomonas reinhardtii*. *Intl. J. Hydrogen Energy* **39**:3657-3665.
24. K.E. Redding\*, I. Sarrou, F. Rappaport, S. Santabarbara, S. Lin, and K. Reifschneider. (2014). Modulation of the fluorescence yield in Heliobacterial cells by induction of charge recombination in the photosynthetic reaction center. *Photosynth Res* **120**:221-235.
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38. Santabarbara, S., K. Reifschneider, A. Jasaitis, F. Gu, G. Agostini, D. Carbonera, F. Rappaport, K.E. Redding\*. (2010). Inter-quinone electron transfer in Photosystem I as evidenced by altering the hydrogen bond to the phylloquinone(s). *J. Phys. Chem. B* **114**:9300-12.
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**Selected Professional Presentations after moving to ASU**

- October, 2019 DOE PI meeting (Photosynthetic Systems cluster): speaker
- October, 2019 US-Japan International Conference on Regulation of Photosynthesis (Kyoto), invited speaker
- July, 2019 Gordon Conference (Photosynthesis), invited speaker
- May, 2019 Eastern Photosynthesis Conference (Woods Hole, MA), keynote speaker
- August, 2018 16<sup>th</sup> International Symposium on Phototrophic Prokaryotes (Vancouver), invited speaker
- March, 2018 Alabama State Science Symposium (Montgomery, AL), keynote speaker
- January, 2018 Western Photosynthesis Conference (Oracle, AZ), invited speaker
- January, 2017 Gordon Conference (Chloroplast Biotechnology), invited speaker
- January, 2017 Western Photosynthesis Conference (Marshall, CA), speaker
- June, 2016 17<sup>th</sup> International Conference on the Cell and Molecular Biology of Chlamydomonas (Kyoto, Japan), keynote speaker
- January, 2016 Western Photosynthesis Conference (Tabernash, CO), speaker
- October, 2015 Yamada Conference: International Symposium on Dynamics and Regulation of Photosynthesis (Nara, Japan), invited speaker
- October, 2015 DOE PI meeting (Photosynthetic Systems cluster): speaker
- August, 2015 15<sup>th</sup> International Symposium on Phototrophic Prokaryotes (Tübingen), invited speaker
- June, 2015 Gordon Conference (Photosynthesis), invited speaker
- June, 2014 ESF-EMBO Conference on “Biology of Plastids – Towards a Blueprint for Synthetic Organelles” (Pultusk, Poland), session chair and invited speaker
- October, 2013 DOE PI meeting (Photosynthetic Systems cluster): speaker
- August, 2013 16<sup>th</sup> International Photosynthesis Congress (St. Louis, MO), session chair
- May, 2013 Banbury conference on “Redesigning Photosynthesis – Identifying Opportunities and Novel Ideas” (Cold Spring Harbor Lab., NY), invited participant
- June, 2012 Light Sensing Symposium (Geneva, Switzerland), invited speaker
- June, 2012 15<sup>th</sup> International Conference on the Cell and Molecular Biology of Chlamydomonas (Potsdam, Germany), invited speaker
- April, 2012 Eastern Regional Photosynthesis Conference (Woods Hole), invited outside speaker
- February, 2012 DOE Genomics Sciences Conference, invited speaker
- January, 2012 Western Photosynthesis Conference (Asilomar, CA), invited speaker and co-organizer
- October, 2011 DOE PI meeting (Photosynthetic Systems cluster): poster presenter
- July, 2011 Indonesian-American Kavli Frontiers of Science Symposium (Bogor, Indonesia), invited speaker
- June, 2011 Gordon Conference (Photosynthesis: Biochemical Aspects), invited speaker
- January, 2011 Western Photosynthesis Conference (Asilomar, CA), primary organizer
- August, 2010 15<sup>th</sup> International Photosynthesis Congress (Beijing, PRC), session chair
- January, 2010 Western Photosynthesis Conference (Asilomar, CA), primary organizer

October, 2009	DOE PIs meeting (Photosynthetic Systems cluster): invited speaker
August, 2009	13 <sup>th</sup> International Symposium on Phototrophic Prokaryotes (Montréal), invited speaker
July, 2009	Gordon Conference (Photosynthesis: Biophysical Aspects), session chair
June, 2009	15 <sup>th</sup> International Congress on Photobiology (Düsseldorf, Germany), session chair
January, 2009	Western Photosynthesis Conference (Asilomar, CA), invited speaker and co-organizer
June, 2008	Gordon Conference (Photosynthesis: Biochemical Aspects), invited speaker
May, 2008	13 <sup>th</sup> International Conference on the Cell and Molecular Biology of Chlamydomonas (Hyères, France), invited speaker
April, 2008	Meeting of La Société Française de Photosynthèse (Paris), invited speaker

### Summary of teaching activities\*

**Biochemistry I&II** (BCH461/561/462/562): two-semester series for advanced undergraduates and first-year graduate students. Taught at UA 1999-2007 and at ASU 2008-2019. Developed online version of BCH461 course and taught in Fall 2018 – Fall 2019.

**Undergraduate research** (BCH392, etc): mentoring of chemistry or biology majors performing research projects in my laboratory. Taught every semester with 1-5 students.

**Diversity of Bioenergetic Mechanisms** (BCH494/598): integrated lab/lecture/independent research course focusing on how extremophilic bacteria make a living on the planet. Taught at UA in Spring 2007 and at ASU in Spring of 2010 and 2013.

**Molecular Mechanisms of Photosynthesis** (BCH568): graduate course on various aspects of photosynthesis. Co-taught at ASU in Fall of 2009 and 2011.

**Genes and Genesis: the relationship between evolution and religion, philosophy and ethics** (BUI301): discussion-based interdisciplinary seminar course developed for the Blount Undergraduate Initiative. Taught at UA in Spring of 2003 and 2006.

\*Note: "UA" refers to The University of Alabama.

## **Summary of service activities**

### **Service to the department/school**

- Chairman of the Undergraduate Program Committee (2013-2016) for DCB/SMS
- Liaison to Barrett Honors College (2013-present)
- Committee on Seminars (2016-2017)
- Search committees (3)
- Septennial Review Committee (2018-2019)
- Chair of the Personnel and Budget Committee (2018-2020)

### **Service to ASU**

- Director of the Center for Bioenergy & Photosynthesis (2015-present)
- Member of the DECISIVE committee on Synthetic Biology
- Member of the Faculty Honor Council since Fall of 2015.  
Chair of the council in AY2018-2020.

### **International scientific societies**

- Secretary of the International Society of Photosynthesis Research (2010-2016)
- Member of the Organizing Committee for the International Symposium on Phototrophic Prokaryotes (2009-2017)
- Organizer of the International Conference on Microbial Photosynthesis (Vancouver, August 9-12, 2018)

### **Service to the Community**

- Formed Algae for Energy Project (funded by NSF grant CBET-1706960) to train local teachers on an educational module for detection of hydrogen produced by algae. Trained 5 elementary school teachers in November of 2017, 11 high school teachers in January of 2019, and 20 high school teachers in January of 2020. Over 200 high school students participated in the project in Spring of 2019.