

SHELLEY E. HAYDEL

CURRICULUM VITAE

NAME:

Shelley E. Haydel

POSITION:

Associate Professor

ADDRESS:

School of Life Sciences
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EDUCATION

| INSTITUTION AND LOCATION | DEGREE | YEAR(S) | FIELD OF STUDY |
|---|----------|----------------|----------------|
| Louisiana Tech University, Ruston, LA | B.S. | 1993 | Microbiology |
| University of Alabama at Birmingham (UAB) Birmingham, AL | Ph.D. | 2000 | Microbiology |
| Washington University in St. Louis St. Louis, MO | Post-doc | 2000 – 2005 | Microbiology |

PROFESSIONAL EXPERIENCE

| | |
|----------------|--|
| 1994 | Laboratory Scientist, Louisiana Department of Public Health, Division of Laboratory Services Central Laboratory, Tuberculosis Laboratory, New Orleans, LA |
| 2000 – 2005 | Postdoctoral Research Associate, Department of Biology, Washington University, St. Louis, MO |
| 2001 – 2004 | Instructor, University College, College of Arts and Sciences, Washington University, St. Louis, MO |
| 2005 – 2011 | Assistant Professor, School of Life Sciences, The Biodesign Institute, Center for Infectious Diseases and Vaccinology, Arizona State University, Tempe, AZ |
| 2011 – present | Associate Professor, School of Life Sciences, The Biodesign Institute, Center for Infectious Diseases and Vaccinology, Arizona State University, Tempe, AZ |

HONORS, AWARDS, AND FELLOWSHIPSEXTERNAL

- 1997 ASM Sustaining Member Student Travel Grant, ASM General Meeting, Miami Beach, FL
- 1997 Leo Pine Student Travel Scholarship, Southeastern Branch ASM Meeting, Helen, GA
- 1999 Leo Pine Student Travel Scholarship, Southeastern Branch ASM Meeting, Jekyll Island, GA
- 1999 President's Award for graduate research and presentation, Southeastern Branch ASM, Jekyll Island, GA
- 2000 – 2002 Heiser Postdoctoral Research Fellowship, Heiser Program for Research in Leprosy and Tuberculosis, New York, NY
- 2002 Arnold Ravin-Muriel Rogers Travel Fellowship, Wind River Conference on Prokaryotic Biology, Estes Park, CO
- 2008 – 2009 National Academies Education Fellow, National Academies – Howard Hughes Medical Institute Summer Institute on Undergraduate Education in Biology, University of Wisconsin – Madison, Madison, WI

INTERNAL

- 1996 David E. Wells Memorial Scholarship, UAB, Department of Microbiology
- 1999 First place award recipient, Sigma Xi / UAB Graduate Student Research Day Competition, Birmingham, AL
- 2000 Samuel B. Barker Award for Excellence presented to the university's outstanding Ph.D. graduate, UAB Graduate School, Birmingham, AL
- 2002 – 2003 Postdoctoral Research Trainee, Washington University School of Medicine, NIH Infectious Diseases Training Grant, St. Louis, MO
- 2006 ASU Selected Applicant for grant submission to the Searle Scholars Program, Tempe, AZ
- 2006 Travel Award, ASU College of Liberal Arts and Sciences, Tempe, AZ
- 2008 Selected Applicant, National Academies – Howard Hughes Medical Institute Summer Institute on Undergraduate Education in Biology, ASU, Tempe, AZ
- 2011 Nominee, ASU College of Liberal Arts and Sciences, Zebulon Pearce Distinguished Teaching Award, Tempe, AZ
- 2012 Employee of the Month, ASU Biodesign Institute, Tempe, AZ, May 2012
- 2013 Teaching Excellence and Innovation Award, ASU School of Life Sciences, Tempe, AZ, May 2013

PUBLICATIONS

PEER-REVIEWED ARTICLES, PUBLISHED

- **Haydel, S. E.**, N. E. Dunlap, W. H. Benjamin, Jr. 1999. *In vitro* evidence of two-component system phosphorylation between the *Mycobacterium tuberculosis* TrcR/TrcS proteins. *Microbial Pathogenesis* 26:195-206. PMID: 10089160.
- **Haydel, S. E.**, W. H. Benjamin, Jr., N. E. Dunlap, and J. E. Clark-Curtiss. 2002. Expression, autoregulation, and DNA binding properties of the *Mycobacterium tuberculosis* TrcR response regulator. *Journal of Bacteriology* 184:2192-2203. PMCID: PMC134962.

- Clark-Curtiss, J. E. and **S. E. Haydel**. 2003. Molecular genetics of *Mycobacterium tuberculosis* pathogenesis. Annual Review of Microbiology 57:517-549. PMID: 14527290.
- **Haydel, S. E.** and J. E. Clark-Curtiss. 2004. Global expression analysis of two-component system regulators during *Mycobacterium tuberculosis* growth in human macrophages. FEMS Microbiology Letters 236:341-347. PMID: 15251217.
- **Haydel, S. E.** and J. E. Clark-Curtiss. 2006. The *Mycobacterium tuberculosis* TrcR response regulator represses transcription of the intracellularly-expressed Rv1057 gene, encoding a seven-bladed β -propeller. Journal of Bacteriology 188:150-159. PMID: PMC1317589.
- **Haydel, S. E.**, C. M. Remenih, and L. B. Williams. 2008. Broad-spectrum in vitro antibacterial activities of clay minerals against antibiotic-susceptible and antibiotic-resistant bacterial pathogens. Journal of Antimicrobial Chemotherapy 61:353-361. PMID: PMC2413170.
- Williams, L. B., **S. E. Haydel**, R. F. Giese, Jr., and D. D. Eberl. 2008. Chemical and mineralogical characteristics of French green clays used for healing. Clays and Clay Minerals. 56:437-452. PMID: PMC2600539.
- Williams, L. B., **S. E. Haydel**, R. E. Ferrell. 2009. Bentonite, band-aids, and borborygmi. Elements 5:99-104. PMID: PMC2895274.
- Cunningham, T. M., J. L. Koehl, J. S. Summers, and **S. E. Haydel**. 2010. pH-dependent metal ion toxicity influences the antibacterial activity of two natural mineral mixtures. PLoS ONE 5(3):e9456 (9 pages). PMID: PMC2830476.
- Williams, L. B. and **S. E. Haydel**. 2010. Evaluation of the medicinal use of clay minerals as antibacterial agents. International Geology Review 52:745-770. PMID: PMC2904249.
- **Haydel, S. E.** 2010. Extensively drug-resistant tuberculosis: a sign of the times and an impetus for antimicrobial discovery. Pharmaceuticals. 3:2268-2290. PMID: PMC3002907.
- Otto, C. C., T. M. Cunningham, M. R. Hansen, and **S. E. Haydel**. 2010. Effects of antibacterial mineral leachates on the cellular ultrastructure, morphology, and membrane integrity of *Escherichia coli* and methicillin-resistant *Staphylococcus aureus*. Annals of Clinical Microbiology and Antimicrobials. 9:26 (13 pages). PMID: PMC2949790. Highly accessed article designation.
- Treuer, R. and **S. E. Haydel**. 2011. Acid-fast staining and Petroff-Hausser chamber counting of mycobacterial cells in liquid suspension. Current Protocols in Microbiology. 20:10A.6.1-10A.6.6. DOI: 10.1002/9780471729259.mc10a06s20. PMID: PMC3071241.
- Otto, C. C. and **S. E. Haydel**. 2011. Morphology of mature *Mycobacterium ulcerans* colonies. ASM MicrobeLibrary 2.0. <http://www.microbelibrary.org/index.php/library/resources/3359-mycobacterium-ulcerans-morphology>. April 28, 2011.
- Pang, X., G. Cao, P. F. Neuenschwander, **S. E. Haydel**, G. Hou, and S. T. Howard. 2011. The β -propeller gene Rv1057 of *Mycobacterium tuberculosis* has a complex promoter directly regulated by both the MprAB and TrcRS two-component systems. Tuberculosis (Edinb). 91:S142-S149. PMID: PMC3248964.
- **Haydel, S. E.**, V. Malhotra, G. L. Cornelison, and J. E. Clark-Curtiss. 2012. The *prxAB* two-component system is essential for *Mycobacterium tuberculosis* viability and is induced during nitrogen-limiting conditions. Journal of Bacteriology. 194:354-361. PMID: PMC3256671.
- Solanky, D. and **S. E. Haydel**. 2012. Adaptation of the neutral bacterial comet assay to assess antimicrobial-mediated DNA double-strand breaks in *Escherichia coli*. Journal of Microbiological Methods. 91:257-261. PMID: PMC3486642.

- Otto, C. C. and **S. E. Haydel**. 2013. Exchangeable ions are responsible for the in vitro antibacterial properties of natural clay mixtures. PLoS ONE 8(5): e64068 (9 pages).
- Otto, C. C. and **S. E. Haydel**. 2013. Microbicidal clays: composition, activity, mechanism of action, and therapeutic applications. A. Méndez-Vilas, ed. In: *Microbial pathogens and strategies for combating them: science, technology and education*. Badajoz, Spain: Formatex Research Center. 2:1169-1180.
- Otto, C. C., Koehl, J. L., D. Solanky, and **S. E. Haydel**. 2014. Metal ions, not metal-catalyzed oxidative stress, cause clay leachate antibacterial activity. PLoS ONE 9(12):e115172 (21 pages). PMID: PMC4263752.
- **Haydel, S. E.** and V. Stout. 2015. A kinesthetic modeling activity to teach PCR fundamentals. CourseSource 2:1-11.

PEER-REVIEWED ABSTRACTS, PUBLISHED

- **Haydel, S. E.** and V. Stout. 2010. Improving student understanding of polymerase chain reaction by incorporating a kinesthetic learning activity. Journal of Microbiology & Biology Education. 11:81-82.

PEER-REVIEWED AND SPONSORED RESEARCH SUPPORT

ACTIVE

- Robert J. Kleberg, Jr. and Helen C. Kleberg Foundation 06/30/15 – 05/10/16
Does *Mycobacterium tuberculosis* use cellular modifications to survive in human macrophages? The goals of this project are to assess recombinant *M. tuberculosis* Fic protein function and identify human targets using nucleic acid-programmable protein arrays, investigate growth and intracellular survival of *fic* and *Rv3642c-fic* mutants, and generate Fic and Rv3642c polyclonal antisera for cellular localization studies.
Role: Co-Principal Investigator
- Potts Memorial Foundation 07/01/15 – 06/30/16
The essential *M. tuberculosis* PrrAB system: characterization of a novel drug target
The goals of this project are to define the PrrAB transcriptome and characterize the mycobacterial lipid profile influenced by the PrrAB two-component regulatory system. This grant provides funds to support the stipend and research of Mr. Jason Maarsingh, a graduate student in my laboratory.
Role: Principal Investigator and Mentor for Jason Maarsingh
- ASU School of Life Sciences RTI Grant 03/20/15 – 03/19/16
DNA binding properties of the essential *M. tuberculosis* PrrA regulator for inhibitor assay development
Role: Principal Investigator
- ASU College of Liberal Arts and Sciences USE Award 05/12/15 – 08/03/15
Cellular localization of *Mycobacterium tuberculosis* Fic-Rv3642c toxin-antitoxin
Summer stipend support of undergraduate researcher, Michelle Stephens
Role: Principal Investigator and Mentor for Michelle Stephens

COMPLETED (LAST 3 YEARS)

- NIH NCCAM R01 AT004691 04/01/09 – 03/31/14 (NCE 3/31/15)
Antibacterial activities of natural minerals and alternative treatment for infections
Role: Principal Investigator

- Biodesign Institute Multi-Center Research Initiative 03/01/14 – 06/30/14
Does *Mycobacterium tuberculosis* use cellular modifications to AMP up virulence?
Role: Co-Principal Investigator
- Illumina Next-Generation Sequencing Small Grant 06/01/13 – 10/30/13
Defining and targeting the essential PrrAB two-component system in *M. tuberculosis*
Role: Principal Investigator
- SoLS Interdisciplinary Research Grant 05/01/12 – 04/30/13
Nanoparticle delivery of the *Mycobacterium ulcerans* mycolactone cytotoxin as a cancer-specific therapeutic
Role: Co-Investigator

PRESENTATIONS

INVITED AND/OR ORAL PRESENTATIONS

1. **Haydel, S. E.** Characterization of the *Mycobacterium tuberculosis* TrcR/TrcS two-component regulatory system. Washington University, Department of Biology, St. Louis, MO. November 8, 1999.
2. **Haydel, S. E.** Autoregulation and DNA binding characteristics of the *Mycobacterium tuberculosis* TrcR response regulator. Washington University Molecular Microbiology and Microbial Pathogenesis Departmental Retreat, Potosi, MO. November 4, 2000.
3. **Haydel, S. E.** Molecular and biochemical characterization of the *Mycobacterium tuberculosis* TrcR response regulator. Washington University School of Medicine, Infectious Diseases/Basic Microbiological Mechanisms Research Conference, St. Louis, MO. March 15, 2001.
4. **Haydel, S. E.** *Mycobacterium tuberculosis* two-component regulatory systems: focusing on the TrcR/TrcS system. Washington University, Department of Biology, Bioforum Seminar Series, St. Louis, MO. March 23, 2001.
5. **Haydel, S. E.** Global expression analysis of the *Mycobacterium tuberculosis* two-component regulators. Washington University School of Medicine, Infectious Diseases/Basic Microbiological Mechanisms Research Conference, St. Louis, MO. March 7, 2002.
6. **Haydel, S. E.** Mutagenesis of *Mycobacterium tuberculosis* two-component systems. Washington University School of Medicine, Infectious Diseases/Basic Microbiological Mechanisms Research Conference, St. Louis, MO. April 24, 2003.
7. **Haydel, S. E.** Molecular analysis of the *Mycobacterium tuberculosis* two-component system regulators. Washington University, Department of Biology, Bioforum Seminar Series, St. Louis, MO. October 1, 2004.
8. **Haydel, S. E.** Mycobacterial regulatory systems and pathogenesis. Arizona State University, School of Life Sciences Seminar, Tempe, AZ. September 16, 2005.
9. **Haydel, S. E.** Mycobacterial regulation and pathogenesis. Arizona State University, Biodesign Institute External Advisory Board meeting, Tempe, AZ. November 1, 2006.
10. **Haydel, S. E.** Broad-spectrum in vitro antibacterial activities of clay minerals against antibiotic-susceptible and antibiotic-resistant bacterial pathogens. Geological Society of America, Annual Meeting, Denver, CO. October 29, 2007.
11. **Haydel, S. E.** Broad-spectrum antibacterial activities of clay minerals. American Chemical Society-Clay Minerals Society, National Meeting, New Orleans, LA. April 6, 2008.

12. **Haydel, S. E.** Antibiotic resistance: What happens when the drugs can't kill the bugs? Arizona Science Center, Phoenix, AZ. May 7, 2010.
13. **Haydel, S. E.** and V. Stout. Using your own hands, Bendaroos[®], and supercoiled yarn to model PCR. Microbrew Session: Mixing Ideas for Successful Teaching Strategies in Microbiology. 17th Annual American Society for Microbiology Conference for Undergraduate Educators, San Diego, CA, May 20, 2010.
14. **Haydel, S. E.** Alternative and complementary antibacterials. Humanist Society of Greater Phoenix. Phoenix, AZ, August 28, 2011.
15. **Haydel, S. E.** Complementary and alternative medicine approach for treating topical bacterial infections. IV International Conference on Environmental, Industrial and Applied Microbiology (BioMicroWorld 2011), Torremolinos, Málaga, Spain, September 14 – 16, 2011.
16. **Haydel, S. E.** Validating natural therapies: Do they work? Spirit of the Senses Organization, Biodesign Institute, Tempe, AZ, August 6, 2012.
17. **Haydel, S. E.** Characterizing and creating antibacterial clay minerals. Arizona Nanotechnology Cluster Seminar, Tempe, AZ, August 23, 2012.
18. **Haydel, S. E.** Superbugs and super problems: methicillin-resistant *Staphylococcus aureus* (MRSA) and carbapenem-resistant Enterobacteriaceae (CRE). Valle del Sol Annual Occupational Health Nurse Conference, Mesa, AZ, October 19, 2013.
19. **Haydel, S. E.** Rise of the superbugs – antibiotic-resistant bacterial infections. Sun Lakes Rotary Club, Sun Lakes, AZ, August 4, 2015.

POSTER PRESENTATIONS

1. Harris, R. H., **S. E. Haydel**, W. H. Benjamin, Jr., and N. E. Dunlap. Identification of response regulator genes in *Mycobacterium tuberculosis*. American Society for Microbiology (ASM) General Meeting, Washington, DC. 1995.
2. **Haydel, S. E.**, R. H. Harris, W. H. Benjamin, Jr., and N. E. Dunlap. Identification of sensor gene fragments in *Mycobacterium tuberculosis*. IBC Mycobacterial Infection Conference, Washington, DC. 1996.
3. Harris, R. H., Y. Huang, **S. E. Haydel**, W. H. Benjamin, Jr., and N. E. Dunlap. Construction of a *Mycobacterium tuberculosis* library and cloning of response regulator genes. IBC Mycobacterial Infection Conference, Washington, DC. 1996.
4. **Haydel, S. E.**, R. H. Harris, W. H. Benjamin, Jr., and N. E. Dunlap. Identification of a two-component regulatory system in *Mycobacterium tuberculosis*. ASM General Meeting, Miami Beach, FL. 1997.
5. **Haydel, S. E.**, C. J. Greeson, W. H. Benjamin, Jr., and N. E. Dunlap. Characterization of the *Mycobacterium tuberculosis* TrcS sensor/histidine kinase. Southeastern Branch ASM Meeting, Helen, GA. 1997.
6. **Haydel, S. E.**, N. E. Dunlap, and W. H. Benjamin, Jr. *In vitro* characterization of the *Mycobacterium tuberculosis* TrcR-TrcS two-component system. ASM General Meeting, Atlanta, GA. 1998.
7. **Haydel, S. E.**, N. E. Dunlap, and W. H. Benjamin, Jr. Autoregulation and target promoters of the *Mycobacterium tuberculosis* TrcR response regulator. Southeastern Branch ASM, Jekyll Island, GA. October 28, 1999.

8. **Haydel, S. E.**, N. E. Dunlap, and W. H. Benjamin, Jr. Autoregulation and characterization of the *Mycobacterium tuberculosis trcRS* two-component system. ASM General Meeting, Chicago, IL. 1999.
9. **Haydel, S. E.**, W. H. Benjamin, Jr., N. E. Dunlap, and J. E. Clark-Curtiss. Targeted promoters of the *Mycobacterium tuberculosis* TrcR response regulator. Keystone Meeting: Molecular and Cellular Aspects of Tuberculosis Research in the Post Genome Era, Taos, NM. 2001.
10. **Haydel, S. E.**, W. H. Benjamin, Jr., N. E. Dunlap, and J. E. Clark-Curtiss. DNA binding properties of the *Mycobacterium tuberculosis* TrcR response regulator. ASM General Meeting, Orlando, FL. 2001.
11. **Haydel, S. E.** and J. E. Clark-Curtiss. Global analysis of *Mycobacterium tuberculosis* two-component system regulators. World Congress on Tuberculosis, Washington, DC. 2002.
12. **Haydel, S. E.** and J. E. Clark-Curtiss. Global expression analysis of *Mycobacterium tuberculosis* two-component system regulators. Wind River Conference on Prokaryotic Biology, Estes Park, CO. 2002.
13. **Haydel, S. E.** and J. E. Clark-Curtiss. Construction and proteomic analysis of an *Mycobacterium tuberculosis trcRS* mutant. ASM General Meeting, Washington, DC. 2003.
14. **Haydel, S. E.** and J. E. Clark-Curtiss. Transcriptional repression of the *rv1057* gene by the *Mycobacterium tuberculosis* TrcR response regulator. ASM General Meeting, New Orleans, LA. 2004.
15. **Haydel, S. E.** and J. E. Clark-Curtiss. The *Mycobacterium tuberculosis* TrcR response regulator represses expression of the *rv1057* gene encoding a seven-bladed β -propeller. Keystone Meeting: Tuberculosis: Integrating Host and Pathogen Biology, Whistler, British Columbia. 2005.
16. Williams, L. B., **S. E. Haydel**, and D. D. Eberl. Scientific validation of antibacterial minerals needed for public policy support. Geological Society of America Annual Meeting, Philadelphia, PA. 2006.
17. Williams, L. B., **S. E. Haydel**, D. D. Eberl. Chemical and mineralogical characteristics of French green clays used for healing. Geological Society of America, Annual Meeting, Denver, CO. October 29, 2007.
18. Cotey, A. and **S. E. Haydel**. Antibacterial properties of natural clay minerals. ASU School of Life Sciences 15th Annual Undergraduate Research Poster Symposium, Tempe, AZ. March 28, 2008.
19. Turner, A., C. Remenih, **S. E. Haydel**, and L. B. Williams. Comparing antibacterial clay properties in search of new medicinal applications. American Chemical Society-Clay Minerals Society, National Meeting, New Orleans, LA. April 6, 2008.
20. Borchardt, T. and **S. E. Haydel**. Assessing the physicochemical properties of antibacterial clay minerals. American Chemical Society-Clay Minerals Society, National Meeting, New Orleans, LA. April 7, 2008.
21. Borchardt, T. and **S. E. Haydel**. Assessing the physicochemical properties of antibacterial clay minerals. ASM Arizona-Southern Nevada Branch 47th Annual Meeting, Tempe, AZ. April 12, 2008.
22. Guida, B. S. and **S. E. Haydel**. Comparative morphological and ultrastructural studies of wild-type and response regulator mutant strains of *Mycobacterium tuberculosis*. Arizona Imaging and Microanalysis Society Conference, Tucson, AZ. March 12, 2009.

23. Cotey, A., T. Borchardt, and **S. E. Haydel**. Minimum bactericidal concentrations and in vitro killing activities of a natural mineral mixture. ASU School of Life Sciences 16th Annual Undergraduate Research Poster Symposium, Tempe, AZ. March 27, 2009.
24. Koehl, J., T. Borchardt, and **S. E. Haydel**. Chelation of natural antibacterial mineral mixtures results in a decrease in bactericidal activity. ASU School of Life Sciences 16th Annual Undergraduate Research Poster Symposium, Tempe, AZ. March 27, 2009.
25. Borchardt, T. and **S. E. Haydel**. Characterization of the bactericidal properties and mechanism of action of antibacterial minerals. ASM General Meeting, Philadelphia, PA. 2009.
26. Guida, B. S. and **S. E. Haydel**. The *Mycobacterium tuberculosis* PdtA two-component response regulator mediates early intracellular adaptation and modulation of cellular morphology. ASM General Meeting, Philadelphia, PA. 2009.
27. Otto, C. C. and **S. E. Haydel**. Ultrastructural analysis of methicillin-resistant *Staphylococcus aureus* exposed to antibacterial leachates. Arizona Imaging and Microanalysis Society Conference, Tempe, AZ. March 12, 2010.
28. Cotey, A. and **S. E. Haydel**. Minimum bactericidal concentrations and cytotoxic effects of antibacterial mineral mixtures. ASU School of Life Sciences 17th Annual Undergraduate Research Poster Symposium, Tempe, AZ. March 26, 2010.
29. Koehl, J. and **S. E. Haydel**. Investigating the role of iron in the antibacterial activity of natural mineral mixtures. ASU School of Life Sciences 17th Annual Undergraduate Research Poster Symposium, Tempe, AZ. March 26, 2010.
30. Otto, C. C., M. Hansen, and **S. E. Haydel**. Analysis of *Escherichia coli* and methicillin-resistant *Staphylococcus aureus* ultrastructure and membrane integrity following exposure to antibacterial mineral leachates. ASM Arizona-Southern Nevada Branch 49th Annual Meeting, Las Vegas, NV. April 17, 2010.
31. Koehl, J. L., T. M. Cunningham, and **S. E. Haydel**. Investigating iron involvement in pH-dependent mineral mixture toxicity. ASM Arizona-Southern Nevada Branch 49th Annual Meeting, Las Vegas, NV. April 17, 2010.
32. **Haydel, S. E.** and V. Stout. Improving student understanding of polymerase chain reaction by incorporating a kinesthetic learning activity. 17th Annual ASM Conference for Undergraduate Educators, San Diego, CA, May 20 – 23, 2010.
33. Cornelison, G. L., V. Malhotra, and **S. E. Haydel**. The *prrAB* two-component system is essential for *Mycobacterium tuberculosis* viability. ASM General Meeting, New Orleans, LA. May 21 – 24, 2011.
34. Otto, C. C. and **S. E. Haydel**. Exploiting natural products to combat antibiotic-resistant pathogens. 2011 Science Foundation Arizona Grand Challenges Summit, Flagstaff, AZ. May 22 – 24, 2011.
35. Otto, C. C., J. L. Koehl, and **S. E. Haydel**. The role of oxidative stress in the antibacterial mechanism of action of a natural clay mineral mixture. IV International Conference on Environmental, Industrial and Applied Microbiology (BioMicroWorld 2011), Torremolinos, Málaga, Spain, September 14 – 16, 2011.
36. Loes, A. N. and **S. E. Haydel**. Physicochemical properties that influence activity of synthetic microbicidal mixtures. ASU School of Life Sciences 19th Annual Undergraduate Research Poster Symposium, Tempe, AZ. March 30, 2012.

37. Solanky, D. and **S. E. Haydel**. Optimization of the bacterial comet assay for the detection of DNA double-strand breaks. ASU School of Life Sciences 19th Annual Undergraduate Research Poster Symposium, Tempe, AZ. March 30, 2012.
38. Otto, C. C. and **S. E. Haydel**. Oxidative stress contributes to the antibacterial activity of a natural clay mineral mixture. ASM Arizona-Southern Nevada Branch 51st Annual Meeting, Tempe, AZ. April 21, 2012.
39. Loes, A. N. and **S. E. Haydel**. Physicochemical properties that influence activity of synthetic microbicidal mixtures. ASM Arizona-Southern Nevada Branch 51st Annual Meeting, Tempe, AZ. April 21, 2012.
40. Solanky, D. and **S. E. Haydel**. Optimization of the bacterial comet assay for the detection of DNA double-strand breaks. ASM Arizona-Southern Nevada Branch 51st Annual Meeting, Tempe, AZ. April 21, 2012.
41. Otto, C. C. and **S. E. Haydel**. Chemical and mineralogical characterization of antibacterial and non-antibacterial clay mineral mixtures. Geobiology Gordon Research Conference – The Future of Geobiology: Perspectives from Graduate and Postdoctoral Research, Ventura, CA. January 27, 2013.
42. Otto, C. C. and **S. E. Haydel**. Chemical and mineralogical characterization of antibacterial and non-antibacterial clay mineral mixtures. Geobiology Gordon Research Conference – Microbe-Mineral Interactions, Biomineralization, and the Rock Record, Ventura, CA. January 30, 2013.
43. Adusumilli, S., E. Fox, R. S. Boyles, and **S. E. Haydel**. Effect of hydrated, antibacterial clay minerals on *Mycobacterium ulcerans* *in vitro* and *in vivo* growth. WHO Geneva Meeting on control and research of Buruli ulcer. WHO Headquarters, Geneva, Switzerland. March 25 – 27, 2013.
44. Loes, A. N. and **S. E. Haydel**. An improved method for rapid, high-quality RNA isolation and purification from *Escherichia coli* exposed to clay mineral mixtures and leachates for metatranscriptomic analysis. ASM General Meeting, Denver, CO. May 21, 2013.
45. Otto, C. C., J. Koehl, D. Solanky, and **S. E. Haydel**. Redox-active metal ions from antibacterial clay minerals damage macromolecules via oxidative stress. ASM General Meeting, Denver, CO. May 21, 2013.
46. Otto, C. C., J. Kilbourne, and **S. E. Haydel**. Antibacterial clay minerals reduce bacterial load in mouse cutaneous MRSA infections. ASM General Meeting, Boston, MA. May 17 – 20, 2014.

TEACHING

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| 2001 - 2004 | Instructor, Biology 5392 Molecular Microbiology and Pathogenesis, Dept. of Biology, University College, Washington University, St. Louis, MO |
| 2006 - 2014 | Instructor, MIC 381 Pathogenic Microbes, ASU School of Life Sciences, Tempe, AZ |
| 2007 - present | Instructor, MIC 379 Medical Bacteriology, ASU School of Life Sciences, Tempe, AZ |
| 2008 | Lecturer, BDE 598 Fundamentals of Biological Design, Immunology and Infectious Diseases Module, ASU, Tempe, AZ |
| 2009 | Instructor, BIO/MCB/MIC 591 Scientific Teaching, ASU School of Life Sciences, Tempe, AZ |
| 2009 | Lecturer, MIC 598 Integrative Microbiology Topics, ASU School of Life Sciences, Tempe, AZ |
| 2009, 2011 | Guest lecturer, BIO 189 Life Sciences Career Paths, ASU School of Life Sciences, Tempe AZ |

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| 2010 | Co-instructor, MIC/MBB 445 Techniques in Molecular Biology, ASU School of Life Sciences, Tempe, AZ |
| 2010 | Co-instructor, MIC/MBB 446 Techniques in Molecular Biology Lab, ASU School of Life Sciences, Tempe, AZ |
| 2015 - present | Instructor, MIC 481/598 Bacterial Pathogenesis, ASU School of Life Sciences, Tempe, AZ |

INSTRUCTIONAL SUPPORT AND FUNDING

- National Academies – Howard Hughes Medical Institute Summer Institute on Undergraduate Education in Biology Award in agreement with the ASU College of Liberal Arts and Sciences.
07/01/08 – present
Total amount - \$5,000
Co-recipients – Shelley E. Haydel and Valerie Stout

SERVICE

PROFESSIONAL SERVICE AND SOCIETY MEMBERSHIPS

- Member, American Society for Microbiology, 1995 – present
- Member, Geological Society of America, 2007 – 2008
- Member, Clay Minerals Society, 2008 – 2009
- Member, American Chemical Society, 2009 – present
- Member, The International Society for Complementary Medicine Research, 2009 – 2010
- Member, Arizona – Southern Nevada ASM Branch, 2010 – 2011
- Judge, Graduate and undergraduate student oral presentations, 49th Annual Southern Nevada ASM Branch Meeting, April 17, 2010
- Review Editor, Frontiers in Cellular and Infection Microbiology Editorial Board, 2010 – present
- Scientific Collaborator, Sign of Science (www.HearTheAnswer.com), 2010 – present
- External Reviewer, Promotion and Tenure process, Department of Biology, Villanova University, 2013

NATIONAL SERVICE – REVIEWER – NATIONAL FUNDING AGENCIES

- NIH National Institute of Allergy and Infectious Diseases, Special Emphasis Panel Study Section, RFA Development of Novel Interventions and Tools for the Control of Malaria, Neglected Tropical Diseases and their Vectors, ZAI1-GSM-M, 2008
- NIH National Institute of Allergy and Infectious Diseases, Microbiology and Infectious Diseases B Subcommittee, February 2009
- US Army Medical Research and Material Command grants program, May 2009
- NIH National Institute of Allergy and Infectious Diseases, RC1 Challenge Grants, Special Emphasis Panel/Scientific Review Group ZRG1-IMM-E, 2009
- NIH National Institute of Allergy and Infectious Diseases, Microbiology and Infectious Diseases B Subcommittee, October 2009

- NIH National Institute of Allergy and Infectious Diseases, Special Emphasis Panel Study Section, U01 International Collaborations in Infectious Disease Research (ICIDR), ZAI1-GSM-M-J1, 2009
- NSF Division of Molecular and Cellular Biosciences, April 2011
- NIH National Center for Complementary & Alternative Medicine, Special Emphasis Panel Study Section, RFA Mechanistic Research on CAM Natural Products, ZAT1 SM (24), July 2011
- NIH National Center for Complementary & Alternative Medicine, Special Emphasis Panel Study Section, RFA Mechanistic Research on CAM Natural Products, ZAT1 SM (25), Feb-March 2012
- NIH National Institute of Allergy and Infectious Diseases, Special Emphasis Panel Study Section, Topics in Bacterial Pathogenesis, IDM-B (80), October 2014
- NIH National Institute of Allergy and Infectious Diseases, Special Emphasis Panel Study Section, Topics in Bacterial Pathogenesis, IDM-B (80), October 2014
- NIH Center for Scientific Review, SBIR/STTR Research Grants – Phase I, Phase II, and Fast-Track; Anti-Infective Therapeutics Special Emphasis Panel, ZRG1 IDM-10, March 2015

NATIONAL SERVICE – AD HOC REVIEWER – JOURNALS

- ACS Applied Materials & Interfaces, 2008
- Immunology Letters, 2008
- ACS Applied Materials & Interfaces, 2009
- ACS Applied Materials & Interfaces, 2010
- Nano LIFE, 2011
- BMC Microbiology, 2013

STATE SERVICE – REVIEWER – STATE FUNDING AGENCIES

- Northern Arizona University (TRIF) competitive grants program, 2009

UNIVERSITY SERVICE

- Member, Phi Kappa Phi, UAB Chapter, 2000
- Member, ASU Faculty Women's Association, 2005 – 2006
- Internal ASU Reviewer, Science Foundation Arizona Competitive Advantage Award New Opportunity Program, 2007
- Member, ASU Radiation Safety Committee, 2012 – present

COLLEGE SERVICE

- Honors Disciplinary Faculty, ASU Barrett Honors College, 2006 – 2007
- Member, ASU Graduate Program in Global Health Exploratory Committee, 2008 – 2009
- Invited Panel Member, CLAS New Assistant Professor Workshop Series – Prepping for Class at ASU, 2014

SCHOOL OF LIFE SCIENCES SERVICE

- Member, Research and Training Initiatives Committee, ASU School of Life Sciences, 2005 – 2008
- Member, ASU School of Life Sciences Undergraduate Curriculum Review Committee for Microbiology, 2006 – 2009
- Scientific Contributor, School of Life Sciences Ask-a-Biologist, 2006 – present
- Member, ASU School of Life Sciences Undergraduate Programs Committee, 2008 – present
- Invited Guest Scientist, ASU School of Life Sciences Ask-a-Biologist. Special program with Mesa Academy student co-hosts. Available on ASU iTunes. 2008
- Invited Guest Scientist, ASU School of Life Sciences Ask-a-Biologist. ASU promotional video produced by Apple. December 2, 2008.
- Member, ASU School of Life Sciences MCB Graduate Program Admissions Committee, 2011 – 2012
- Member, ASU School of Life Sciences MIC Graduate Program Admissions Committee, 2012 – present
- Member, ASU School of Life Sciences Scholarship and Awards Selection Committee, 2012
- Member, ASU School of Life Sciences Instructional Professional Search Committee, 2012
- Peer Teaching Evaluator, ASU School of Life Sciences Faculty (1 Assistant Professor, 1 Associate Professor), Fall 2013
- Member, ASU School of Life Sciences Assessment Committee, 2014 – present
- Member, Microbiomics Faculty Search Committee, 2014 – present
- Peer Teaching Evaluator, ASU School of Life Sciences Faculty (1 Lecturer), Fall 2014
- Peer Teaching Mentor, ASU School of Life Sciences Faculty (1 Associate Professor), Fall 2014 – present
- Guest Blogger, SoLS Teach Tech Blog (<http://asutechwebs.blogspot.com/2014/12/how-can-i-get-groups-to-work-effectively.html/>), Fall 2014

INSTITUTE AND CENTER SERVICE

- Member, ASU Biodesign Institute Center for Infectious Diseases and Vaccinology Building B Operations Committee, 2006 – 2010
- Member, ASU Biodesign Institute Center for Infectious Diseases and Vaccinology Seminar Committee, 2007 – 2008
- Member, ASU Biodesign Institute Faculty Advisory Team, Space Allocation Team, 2011 – present
- Reviewer, ASU Biodesign Institute Industrial Liaison Program, 2013 – present
- Chair, ASU Biodesign Institute Center for Infectious Diseases and Vaccinology Seminar Committee, 2014 – 2015
- Member, ASU Biodesign Institute Space Utilization Committee, 2015 – present

PROFESSIONALLY-RELATED COMMUNITY SERVICE

- Invited Guest Scientist and Speaker, Girls, Math and Science Partnership, Carnegie Science Center and Arizona Science Center, Phoenix, AZ, 2009

- Invited Guest Scientist and Speaker, Arizona Science Center, Adults' Night Out Science Lecture Program, Phoenix, AZ, 2010
- Laboratory Host and Tour, Hands-On Science Day for young female students (grades 5 – 12) who won Excellence Awards from Central Arizona Chapter of the Association for Women in Science at the 2011 Arizona Science and Engineering Fair, May 5, 2011
- Invited Guest Scientist and Speaker, Humanist Society of Greater Phoenix, Phoenix, AZ, August 28, 2011
- Laboratory Host and Tour, Hands-On Science Day for young female students (grades 5 – 12) who won Excellence Awards from Central Arizona Chapter of the Association for Women in Science at the 2012 Arizona Science and Engineering Fair, May 4, 2012
- ASU Night of the Open Door, Haydel Lab display, activity, and participation, Biodesign Institute, March 2, 2013
- Invited Speaker, Valle del Sol Annual Occupational Health Nurse Conference, Mesa, AZ, October 19, 2013
- Invited Speaker, Sun Lakes Rotary Club, Sun Lakes, AZ, August 4, 2015

PUBLIC OUTREACH AND SCIENTIFIC RECOGNITION

TELEVISION PRODUCTIONS, NEWSCASTS, OR RADIO INTERVIEWS

1. "Antibacterial clays." Medstar Television interview/production of a 2-minute health news segment for nationwide ABC network affiliates. Interview and taping, March 2007. Segment released June 2007. Shown as health segment on Phoenix ABC15 news.
2. Phoenix ABC15 news interview discussing tuberculosis. May 2007.
3. Live radio interview with John Pienaar and Lesley Ashmall on BBC Radio 5 LIVE, a national network in the UK. October 28, 2007.
4. MicrobeWorld Radio interview for 90-second radio feature on antibacterial clay minerals. Finger Lakes Productions International for the American Society of Microbiology. January 25, 2008.
5. Sign of Science interview. "Clay has been used in folk remedies to treat infections for centuries. Is there any evidence it works?" January 2008. Transcript is available online at <http://www.heartheanswer.com/index.php?action=feature&qid=475>
6. ReachMD Radio program interview discussing the antibacterial clay minerals. April 24, 2008. Broadcasted on XM Satellite radio.
7. Phoenix Channel 12 News Today segment, "Germiest Desk", aired on November 16, 2011. Present in the studio and on the live news show. <http://www.azcentral.com/video/#/Germs+on+your+office+desk/1278506955001>
8. Phoenix Channel 3 Your Life A to Z segment for 2013 ASU Homecoming Block Party, "Germ spreader activity", aired on October 17, 2013. Recorded at studio location.
9. "Clay can kill some antibiotic-resistant bacteria." Inside Science TV interview/production of a 45-second health news segment for nationwide network affiliates. Interview and taping, July 25, 2013. Segment released on October 15, 2013. <http://www.insidescience.org/content/clay-can-kill-some-antibiotic-resistant-bacteria/1449>

PRESS AND NEWS RELEASES

1. "ASU researchers test antibacterial effects of healing clays: National Institutes of Health fund humanitarian response." ASU College of Liberal Arts and Science News Release. http://clas.asu.edu/newsevents/newsreleases/2006/WilliamsHaydelResearch_11012006.htm. November 1, 2006.
2. "Drugstore in the dirt." The Geological Society of America News Release. <http://www.geosociety.org/news/pr/07-58.htm>. October 25, 2007.
3. "Healing clays show promise for fighting deadly MRSA superbug infections, other diseases." American Chemical Society Press Release. April 6, 2008.
4. "Mineral studies advance antibacterial alternatives." ASU News Release. http://asunews.asu.edu/20100303_killingclay. March 3, 2010.
5. "Attacking MRSA with metals from antibacterial clays." ASU News Release. http://asunews.asu.edu/20130517_antibacterialclays. May 17, 2013.

PODCASTS

1. "Antibacterial Clay, a New Medical Frontier." ASU School of Life Sciences Science Studio. Vol. 002. November 2006. <http://sols.asu.edu/podcasts/index.php?year=2007>
2. "Tuberculosis." ASU iPopping Podcast Vol. 021. Student Programming, May 2007.
3. "Mud Science – Healing with Clays." ASU Ask A Biologist with Mesa Academy student co-host. October 2008. <http://askabiologist.asu.edu/podcasts/mud-science-healing-clays>

NEWS ARTICLES AND MEDIA INTERVIEWS

1. "ASU researchers test antibacterial effects of healing clays: National Institutes of Health fund humanitarian response." ASU School of Life Sciences. http://sols.asu.edu/sols_news/43_news_06.php. November 1, 2006.
2. "Researchers mold clay into potential therapy." ASU home web page. http://www.asu.edu/news/features/archive_fall06.htm. November 2, 2006.
3. "Move over, penicillin: Researchers mold clay into potential therapy." ASU Insight newspaper. http://www.asu.edu/news/stories/200611/20061102_clay.htm, November 2, 2006.
4. "Clays heal skin disease: Researchers study healing properties of old French remedy." ASU State Press student newspaper. <http://www.asuwebdevil.com/issues/2006/11/06/news/698684>. November 5, 2006.
5. "Clay...the next topical penicillin?" ASU Research Magazine, Magazine of Scholarship and Creative Activity at ASU, Winter 2006 edition, p. 7.
6. "Bacteria beware! Novel technologies could knockout old enemies." ASU School of Life Sciences Newsletter, Spring 2007, Volume 3, No. 1, p. 16-17.
7. "Researchers delve into antibacterial properties of particular French clays." Microbe, The News Magazine of the American Society for Microbiology, February 2007, Vol. 2, No. 2.

8. "Antibacterial effects of healing clays." 2007. *Geology Today. News and Comment.* 23(2):51.
9. "Healing clay." *ASU Research Magazine, Magazine of Scholarship and Creative Activity at ASU*, Spring/Summer 2007 edition, p. 20-23.
10. "The dirt on curing clays". *Discovery News*. <http://dsc.discovery.com/news/2007/10/25/clay-cure-bacteria.html>. October 25, 2007.
11. "Scientists find dirty way to kill bacteria." *The Washington Times*. <http://www.washingtontimes.com/article/20071026/NATION/110260077/1002/NATION> October 26, 2007.
12. "French clay can kill MRSA and 'flesh-eating' bacteria." *Science Daily*. <http://www.sciencedaily.com/releases/2007/10/071025120514.htm>. October 26, 2007.
13. "French muck: is this the new penicillin?" *The London Independent*. <http://news.independent.co.uk/health/article3104663.ece>. October 28, 2007.
14. "Watch out hand sanitizer. Clay kills bacteria too." *Science Friday*. <http://www.sciencefriday.com/newsbriefs/read/152>. November 2, 2007.
15. "Clay that kills: ground yields antibacterial agents." *Science News*. Vol. 172, No. 18, p. 276. <http://www.sciencenews.org/articles/20071103/fob4.asp>. November 3, 2007.
16. "How do you stop flesh-eating bacteria? Apply some clay." *Scientific American*. <http://www.sciam.com/article.cfm?SID=mail&articleID=264E90CF-E7F2-99DF-3457F4A15A6235B9&chanID=sa003>. November 9, 2007.
17. Reader's Digest interview for *Medical Breakthrough* story on antibacterial clay minerals. December 20, 2007.
18. "Miracle muds." *Geotimes Magazine*, Volume 53, No. 2. Published by the American Geological Institute.
19. "Mud harnessed to fight infection." *HealthDay*, NY Times syndicate. Featured in *The Washington Post*, *Yahoo News*, and *U.S. News & World Report*. April 6, 2008. <http://www.healthday.com/Article.asp?AID=614228>
20. "Feat of clay: Certain types kill bacteria." *USA Today*. April 6, 2008. www.usatoday.com/news/health/2008-04-06-medical-clay_N.htm?loc=interstitialskip
21. "ASU professors study healing potential of clay." *The Arizona Republic*. Front page story, top of fold. April 7, 2008. <http://www.azcentral.com/community/tempe/articles/2008/04/07/20080407claycure0407.html>
22. "Alligators could help fight MRSA." *The Daily Telegraph*, London. April 7, 2008. <http://www.telegraph.co.uk/earth/main.jhtml?xml=/earth/2008/04/07/scigators107.xml>
23. "Clays hold promise in fight against infections." *Arizona State University News*. Featured on the www.asu.edu home page. April 7, 2008. http://asunews.asu.edu/20080409_healingclay
24. "New attack on deadly bacteria?" *The Why Files*. April 10, 2008. http://whyfiles.org/277new_antibio/
25. "Healing clays may help fight diseases." *The Times of India*. April 13, 2008. http://timesofindia.indiatimes.com/Healing_clays_may_help_fight_diseases/articleshow/2949087.cms
26. "Getting the bugs out of teaching microbiology". *ASU Insight newspaper*. June 27, 2008.

27. "The killing power of clay: advancing antibacterial alternatives." R & D Magazine. March 4, 2010. <http://www.rdmag.com/News/2010/03/Materials-Biomaterials-The-Killing-Power-Of-Clay/>
28. "Mineral mixtures demonstrate antibacterial properties." Pharmaceutical Formulation & Quality. March 23, 2010. <http://www.pharmaquality.com/ME2/Audiences/dirmod.asp?sid=BF3160A0C0AF43AA8EFF0F9D82A6E878&nm=News&type=Publishing&mod=Publications%3A%3AArticles&mid=55EB3633343F4B9F8E1BD5237AB9605A&tier=4&id=8E724AC676B542BFAD509F994414D1EE&AudID=A09BDC96A28B46C5BF71CF25FA77500E>
29. "Deadly superbugs drawing increased attention, local research efforts." Phoenix Business Journal. April 5, 2013. <http://www.bizjournals.com/phoenix/print-edition/2013/04/05/deadly-superbugs-drawing-increased.html>
30. "Attacking MRSA with metals from antibacterial clays." EurekAlert! May 17, 2013. http://www.eurekalert.org/pub_releases/2013-05/asu-amw051713.php
31. "Got A Wound? Science Says Rub Some Dirt In It." Popular Science. May 22, 2013. <http://www.popsci.com/science/article/2013-05/antibacterial-clays-can-kill-antibiotic-resistant-e-coli-and-mrsa>
32. "Rub some dirt in it works for wounds." United Press International. May 22, 2013. <http://www.upi.com/blog/2013/05/22/Study-Rub-some-dirt-in-it-works-for-wounds/1401369256308/>
33. "Metal ions in clay lead the way against MRSA." The Institute of Materials, Minerals and Mining. July 1, 2013. <http://www.iom3.org/news/metal-ions-clay-lead-way-against-mrsa>
34. "Golden opportunity to uncover your inner scientist at the Biodesign Institute ASU Homecoming tent. Biodesign E-News. <http://www.biodesign.asu.edu/news/golden-opportunity-to-uncover-your-inner-scientist-at-the-biodesign-institute-asu-homecoming-tent> October 7, 2013.
35. "ASU researcher developing antibacterial clay." ASU News. October 16, 2013. <http://asunews.asu.edu/20131016-antibacterial-clay>