

## **Tyrrell Conway, Ph.D.**

Regents Professor and Head of Department  
Microbiology and Molecular Genetics  
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### **Education:**

1975: College High School, Bartlesville, OK  
1979: B.S., Oklahoma State University (Microbiology)  
1984: Ph.D., Oklahoma State University (Microbiology)  
1985: Postdoctoral Research Associate, Oklahoma State University  
1985-1988: Faculty Research Assistant (non-tenure track), University of Florida

### **Academic Appointments:**

1988-1993: Assistant Professor of Biological Sciences, University of Nebraska  
1992-1993: Acting Associate Director, Center for Biotechnology, University of Nebraska  
1993-1994: Associate Professor of Biological Sciences, University of Nebraska  
1994-1999: Associate Professor of Microbiology, Ohio State University  
1999-2004: Associate Professor of Microbiology, University of Oklahoma  
2000-2009: Director, OU Microarray Core Facility, University of Oklahoma  
2000-2009: Director, OU Center for Informatics, University of Oklahoma  
2001-2009: Director, Oklahoma Bioinformatics Network (INBRE), Statewide Project  
1999-2014: Co-Director, OU Advanced Center for Genome Technology  
2004-2008: Professor of Microbiology, University of Oklahoma  
2008-2015: Henry Zarrow Presidential Professor, University of Oklahoma  
2015-2017: Professor of Microbiology, Oklahoma State University  
2015-present: Head of Department of Microbiology, Oklahoma State University  
2017-present: Regents Professor of Microbiology, Oklahoma State University

### **Awards and Honors:**

1989: Maude Hammond Fling Faculty Fellowship  
1991: Co-inventor of U.S. Patent No. 5,000,000  
1994: Recognition for Contributions to Students, The Parents Association of the University of Nebraska-Lincoln  
1994: Morter Board, Chapter Citation Award, University of Nebraska  
2001: Alpha Phi Omega, University of Oklahoma Delta Beta Chapter, "Leader of the 21<sup>st</sup> Century" Award  
2008: Henry Zarrow Presidential Professorship  
2012: American Society for Microbiology, Chair of Division K  
2013: American Academy of Microbiology, Inducted  
2013: Honorary Coach, OU Women's Basketball  
2017: Chi Omega Sorority Faculty Appreciation Dinner  
2017: Who's Who in Science and Engineering

2017: Regents Professor, Oklahoma State University  
2019: Oklahoma State University Career Services Career Champion

### Research Support:

Current:

- 3/1/17 to 1/31/21: NIH National Institute of General Medical Sciences, RO1 GM117324-01A1, "Mechanisms of Nutrient Competition in the Intestine", Awarded: \$1,181,670
  - 10/1/17 to 10/31/20: NIH National Institute of General Medical Sciences, 3R01GM117324-01A1S1, Diversity Supplement to Parent Project "Mechanisms of Nutrient Competition in the Intestine", Awarded: \$189,234
- Past:

- 01/01/11 to 12/31/14: NIH/NIGMS, 1R01GM095370-01, "Symbiosis of *E. coli* and the Intestinal Microbiota in a Mouse Model", Awarded: \$1,650,000
  - 09/30/09 to 8/31/12: NIH/NIGMS, RC1GM09207, "Comprehensive Mapping and Annotation of the *E. coli* Transcriptome", Awarded: \$1,000,000
  - 6/01/04 to 5/31/09: NIH, 2R01-AI48945-05, "Growth and Colonization of the Intestine by *E. coli*", Awarded: \$2,158,563
- More than 25 grant awards from DOE, USDA, NREL, NSF, Genencor, and NIH

Continuously funded since 1990, totaling more than \$17M

### Selected Publications:

1. Mokszycki, M. C., Leatham-Jensen, M., Steffensen, J. L., Zhang, Y., Krogfelt, K. A., Caldwell, M. E., Conway, T., and Cohen, P. S. 2018. A Simple *In Vitro* Gut Model for Studying the Interaction between *Escherichia coli* and the Intestinal Commensal Microbiota in Cecal Mucus. *Appl Environ Microbiol*. Submitted.
2. Kröger, C., MacKenzie, K., Alshabib, E., Kirzinger, M., Suchan, D., Chao, Tzu-C., Akulova, V., Miranda-CasoLuengo, A., Monzon, V., Conway, T., Sivasankaran, S., Hinton, J., Hokamp, K., and Cameron, A. 2018. The primary transcriptome, small RNAs, and regulation of antimicrobial resistance in *Acinetobacter baumannii*. *Nucleic Acids Research*. IN PRESS.
3. Conway, T. and Cohen, P.S. 2015. Applying the restaurant hypothesis to intestinal microbiota. *Microbe*. 10(8): 324-8.
4. Conway, T. and Cohen, P.S. 2015. Commensal and Pathogenic *Escherichia coli* Metabolism in the Gut. *Microbiol Spectr*. 3(3) doi: 10.1128/microbiolspec.MBP-0006-2014. PMID: 26185077.
5. Schinner S.A., Mokszycki M.E., Adediran J., Leatham Jensen M., Conway T., Cohen P.S. 2015. *Escherichia coli* EDL933 Requires Gluconeogenic Nutrients to Successfully Colonize the Intestines of Streptomycin-Treated Mice Pre-colonized with *E. coli* Nissle 1917. *Infect Immun*. 83:1983-1991. PMID: 25733524.
6. Creecy, J. P. and T. Conway. 2015. Quantitative bacterial transcriptomics with RNA-seq. *Curr Opin Microbiol*. 2015, 23:133–140. PMID: 25483350.
7. Otsuka Y, Muto A, Takeuchi R, Okada C, Ishikawa M, Nakamura K, Yamamoto N, Dose H, Nakahigashi K, Tanishima S, Suharnan S, Nomura W, Nakayashiki T, Aref WG, Bochner BR, Conway T, Gribskov M, Kihara D, Rudd KE, Tohsato Y, Wanner BL, Mori H. 2014. GenoBase: comprehensive resource database of *Escherichia coli* K-12. *Nucleic Acids Res*. Nov 15. pii: gku1164 (Epub). PMID: 25399415.
8. Conway T., Creecy J.P., Maddox S.M., Grissom J.E., Conkle T.L., Shadid T.M., Teramoto J., San Miguel P., Shimada T., Ishihama A., Mori H., Wanner B.L. Unprecedented high-resolution view of bacterial operon architecture revealed by RNA sequencing. *MBio*. 2014 Jul 8;5(4):e01442-14. PMID: 25006232.
9. Meador JP, Caldwell ME, Cohen PS, Conway, T. 2014. *Escherichia coli* pathotypes occupy distinct niches in the mouse intestine. *Infect Immun*. 82(5): 1931-1938. PMID: 24566621.
10. Adediran, J., M. Leatham-Jensen, M.E. Mokszycki, J. Frimodt-Møller, K.A. Krogfelt, K. Kazmierczak, L.J. Kenney, T. Conway, and P.S. Cohen. 2014. An *Escherichia coli* Nissle 1917 envZ Missense Mutant Colonizes the Streptomycin-Treated Mouse Intestine Better than the Wildtype but is not a Better Probiotic. *Infect. Immun*. 82:670-682. PMID: 24478082.

11. Kröger, C., A. Colgan, S. Srikumar, K. Händler, S.K. Sivasankaran, D.L. Hammarlöf, R. Canals, J.E. Grissom, T. Conway, K. Hokamp, and J.C. Hinton. 2013. An Infection-Relevant Transcriptomic Compendium for *Salmonella enterica* Serovar Typhimurium. *Cell Host Microbe* 14:683-695. PMID: 24331466.
12. Bertin Y., F. Chaucheyras-Durand, C. Robbe-Masselot, A. Durand, A. de la Foye, J. Harel, P.S. Cohen, T. Conway, E. Forano, C. Martin. 2012. Carbohydrate utilization by enterohaemorrhagic *Escherichia coli* O157:H7 in bovine intestinal content. *Environ Microbiol* 15(2):610-22. PMID: 23126484.
13. Maltby, R., M.P. Leatham-Jensen, T. Gibson, P.S. Cohen, and T. Conway. 2013. Nutritional Basis for Colonization Resistance by Human Commensal *Escherichia coli* Strains HS and Nissle 1917 against *E. coli* O157:H7 in the Mouse Intestine. *PLoS One* 8(1):e53957. PMID: 23349773.
14. Leatham-Jensen, M.P., J. Frimodt-Møller, J. Adediran, M.E. Mokszycki, M.E. Banner, J.E. Caugthon, K.A. Krogfelt, T. Conway, P.S. Cohen. 2012. The streptomycin-treated mouse intestine selects *Escherichia coli envZ* missense mutants that interact with dense and diverse intestinal microbiota. *Infect Immun* 80:1716-27. PMID: 22392928.
15. Pi, H., S.A. Jones, L.E. Mercer, J.P. Meador, J.E. Caugthon, L. Jordan, S.M. Newton, T. Conway, P.E. Klebba. 2012. Role of Catecholate Siderophores in Gram-Negative Bacterial Colonization of the Mouse Gut. *PLoS One* 7(11):e50020. PMID: 23209633.
16. Maddox, S.M., P.S. Coburn, N. Shankar, and T. Conway. 2012. Transcriptional Regulator PerA Influences Biofilm-Associated, Platelet Binding, and Metabolic Gene Expression in *Enterococcus faecalis*. *PLoS One* 7(4): e34398. PMID: 22496800.
17. Jones S. A., T. Gibson, R. C. Maltby, F. Chowdhury, V. Stewart, P. S. Cohen, T. Conway. 2011. Anaerobic respiration of *Escherichia coli* in the mouse intestine. *Infect Immun*. 79:4218-26. PMID: 21825069.
18. Fabich, A. J., M. P. Leatham, J. E. Grissom, G. Wiley, H. Lai, F. Najar, B. A. Roe, P. S. Cohen, and T. Conway. 2011. Genotype and phenotypes of an intestine-adapted *Escherichia coli* K-12 mutant selected by animal passage for superior colonization. *Infect Immun*. 79:2430-2439. PMID: 21422176.
19. Traxler, M. F., M. Zacharia, S. Marquardt, S. M. Summers, H.-T. Nguyen, S. E. Stark and T. Conway. 2011. Discretely calibrated regulatory loops controlled by ppGpp partition gene induction across the 'feast to famine' gradient in *Escherichia coli*. *Mol Microbiol*. 79:830-845. PMID: 21299642.
20. Conway, T., and Cohen P.S. 2010. *E. coli* metabolism in the intestine. *Nova Acta Leopoldina* 111:103-110..
21. Jacobsen, L., L. Durso, T. Conway, and K. W. Nickerson. 2009. *Escherichia coli* O157:H7 and other *E. coli* strains share physiological properties associated with intestinal colonization. *Appl Environ Microbiol* 75:4633-5. PMID: 19411408.
22. Leatham, M. P., S. Banerjee, S. M. Autieri, R. Mercado-Lubo, T. Conway, and P. S. Cohen. 2009. Pre-colonized Human Commensal *E. coli* Strains Serve as a Barrier to *E. coli* O157:H7 Growth in the Mouse Intestine. *Infect Immun* 77:2876-86. PMID: 19364832.
23. Snider, T. A., A. J. Fabich, T. Conway, and K. D. Clinkenbeard. 2008. *E. coli* O157:H7 catabolism of intestinal mucin-derived carbohydrates and colonization. *Vet Microbiol*. 36:150-4. PMID: 19095384.
24. Mercado-Lubo R., M. P. Leatham, T. Conway, P. S. Cohen. 2009. *Salmonella enterica* serovar Typhimurium mutants unable to convert malate to pyruvate and oxaloacetate are avirulent and immunogenic in BALB/c mice. *Infect Immun* 77:1397-405. PMID: 19168732.
25. Hu J.C., R. Aramayo, D. Bolser, T. Conway, C.G. Elsik, M. Gribskov, T. Kelder, D. Kihara, T.F. Knight Jr, A.R. Pico, D.A. Siegele, B. L. Wanner, R. D. Welch. 2008. The emerging world of wikis. *Science*. 320(5881):1289-90. PMID: 18535227.
26. Jones, S. A., M. Jorgensen, F. Z. Chowdhury, R. Rodgers, J. Hartline, M. P. Leatham, C. Struve, K. A. Krogfelt, P. S. Cohen, and T. Conway. 2008. Glycogen and Maltose Utilization by *Escherichia coli* O157:H7 in the Mouse Intestine. *Infect Immun* 76:2531-40. PMID: 18347038.
27. Traxler, M. F., S. M. Summers, H. T. Nguyen, V. M. Zacharia, G. A. Hightower, J. T. Smith, and T. Conway. 2008. The global, ppGpp-mediated stringent response to amino acid starvation in *Escherichia coli*. *Mol Microbiol* 68:1128-48. PMID: 18430135. Citations: 83.
28. Mercado-Lubo, R., E. J. Gauger, M. P. Leatham, T. Conway, and P. S. Cohen. 2008. A *Salmonella enterica* serovar Typhimurium Succinate Dehydrogenase/Fumarate Reductase Double Mutant is Avirulent and Immunogenic in BALB/c Mice. *Infect Immun* 76:1128-34. PMID: 18086808.
29. Fabich, A. J., S. A. Jones, F. Z. Chowdhury, A. Cernosek, A. Anderson, D. Smalley, J. W. McHargue, G. A. Hightower, J. T. Smith, S. M. Autieri, M. P. Leatham, J. J. Lins, R. L. Allen, D. C. Laux, P. S. Cohen, and T. Conway. 2008. Comparative carbon nutrition of pathogenic and commensal *Escherichia coli* in the mouse intestine *Infect Immun* 76:1143-52. (Selected for "Editor's Spotlight") PMID: 18180286.
30. Autieri, S. M., J. J. Lins, M. P. Leatham, D. C. Laux, T. Conway, and P. S. Cohen. 2007. L-Fucose Stimulates Utilization of D-Ribose by *Escherichia coli* MG1655 Delta-*fucAO* and *E. coli* Nissle 1917 Delta-*fucAO* Mutants in the Mouse Intestine and in M9 Minimal Medium. *Infect Immun*. 75:5465-75. (Selected for "Editor's Spotlight") PMID: 17709419.
31. Jones, S. A., F. Z. Chowdhury, A. J. Fabich, A. Anderson, D. M. Schreiner, A. L. House, S. M. Autieri, M. P. Leatham, J. J. Lins, M. Jorgensen, P. S. Cohen, and T. Conway. 2007. Respiration of *Escherichia coli* in the Mouse Intestine. *Infect Immun* 75:4891-9. (Selected for "Editor's Spotlight") PMID: 17698572.

32. Gauger, E. J., M. P. Leatham, R. Mercado-Lubo, D. C. Laux, T. Conway, P. S. Cohen. 2007. Role of Motility and the *flhDC* Operon in *Escherichia coli* MG1655 Colonization of the Mouse Intestine. *Infect Immun.* 75:3315-24. PMID: 17438023.
33. Snider, T. A., A. J. Fabich, K. E. Washburn, W. P. Sims, J. L. Blair, P. S. Cohen, T. Conway, and K. D. Clinkenbeard. 2006. Evaluation of a model for *Escherichia coli* O157:H7 colonization in streptomycin-treated adult cattle. *Am J Vet Res.* 67:1914-20. PMID: 17078755.
34. Wren J.D. and T. Conway. 2006. Meta-Analysis of Published Transcriptional and Translational Fold-changes Reveals a Bias Towards Low-fold Induction. *OMICS.* 10(1):15-27. PMID: 16584315.
35. Traxler, M. F., D.-E. Chang, and T. Conway. 2006. Guanosine 5',3'-bispyrophosphate coordinates global gene expression during glucose-lactose diauxie in *Escherichia coli*. *Proc. Nat. Acad. Sci.* **103**: 2374-2379. PMID: 16467149.
36. Tchawa Yimga M., M. P. Leatham, J. H. Allen, D. C. Laux, T. Conway, and P. S. Cohen. 2006. Role of gluconeogenesis and the tricarboxylic acid cycle in the virulence of *Salmonella enterica* serovar Typhimurium in BALB/c mice. *Infect. Immun.* **74**:1130-40 PMID: 16428761.
37. Wren J.D., J.E. Grissom, and T. Conway. 2006. Email decay rates among MEDLINE corresponding authors. *EMBO Reports.* **7**: 122-127. PMID: 16452921.
38. Leatham, M. P., S. J. Stevenson, E. J. Gauger, K. A. Krogfelt, J. Lins, T. L. Haddock, S. M. Autieri, T. Conway, and P. S. Cohen. 2005. The mouse intestine selects stable non-motile *flhDC* operon deletion mutants of *Escherichia coli* MG1655 with increased mouse large intestine colonizing ability and more efficient utilization of carbon sources. *Infect. Immun.* **73**: 8039-8049. PMID: 16299298.
39. Murray, E. L. and T. Conway. 2005. Multiple regulators control expression of the Entner-Doudoroff aldolase (Eda) of *Escherichia coli*. *J. Bacteriol.* **187**: 991-1000. PMID: 15659677.
40. Santosa, B., T. Conway, and T.B. Trafalis. 2005. A hybrid knowledge based-clustering multi-class SVM approach for genes expression analysis. *Biomedicine* 2005.
41. Bates Utz, C., A. B. Nguyen, D. J. Smalley, A. B. Anderson, and T. Conway. 2004. GntP is the *Escherichia coli* Fructuronic Acid Transporter and Belongs to the UxuR Regulon. *J. Bacteriol.* **186**:7690-7696. PMID: 15516583.
42. Wren, J. D., M. Yao, M. Langer, and Tyrrell Conway. 2004. Simulated annealing of microarray data reduces noise and enables cross-experimental comparisons. *DNA Cell Biol.* **23**: 695-700. PMID: 15585127.
43. Chang, D.E., D. Smalley, D. L. Tucker, M. P. Leatham, W. E. Norris, S. J. Stevenson, A. B. Anderson, J. E. Grissom, D. C. Laux, P. S. Cohen, and T. Conway. Carbon nutrition of *Escherichia coli* in the mouse intestine. 2004. *Proc. Nat. Acad. Sci.* **101**: 7427-7432. PMID: 15123798.
44. Miranda, R. L., T. Conway, M. P. Leatham, D. E. Chang, D. L. Tucker, W. E. Norris, J. H. Allen, S. J. Stevenson, D. C. Laux, and P. S. Cohen. 2004. Glycolytic and gluconeogenic growth of *Escherichia coli* O157:H7 (EDL933) and *E. coli* K-12 (MG1655) in the mouse intestine. *Infect. Immun.* **72**: 1666-76. PMID: 14977974.
45. Bausch, C., M. Ramsey, and T. Conway. 2004. Transcriptional Organization and Regulation of the L-Idonic Acid Pathway (GntII System) In *Escherichia coli*. *J. Bacteriol.* **186**: 1388-97. PMID: 14973046.
46. Ma, Z., S. Gong, D. L. Tucker, T. Conway, and J. W. Foster. 2003. GadE (YhiE) activates glutamate decarboxylase-dependent acid resistance in *Escherichia coli* K12. *Mol. Microbiol.* **49**: 1309-1320. PMID: 12940989.
47. Wanken, A., T. Conway, and K. A. Eaton. 2003. The Entner-Doudoroff pathway has little effect on *Helicobacter pylori* colonization of mice. *Infect. Immun.* **71**: 2920-2923. PMID: 12704170.
48. Wolfe, A. J., D.E. Chang, J. D. Walker, J. E. Seitz-Partridge, M. D. Vidaurri, B. Pruess, M. C. Henk, J. C. Larkin, and T. Conway. 2003. Evidence that acetyl phosphate functions as a global signal during biofilm development. *Mol. Microbiol.* **48**: 977-988. PMID: 12753190.
49. Tucker, D. L., N. Tucker, Z. Ma, J. W. Foster, R. L. Miranda, P. S. Cohen, and T. Conway. 2003. Genes of the GadX-GadW regulon in *E. coli*. *J. Bacteriol.* **185**: 3190-3201. PMID: 12730179.
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51. Møller, A., T. Conway, P. Nuijten, K. A. Krogfelt and P. S. Cohen. 2003. An *Escherichia coli* MG1655 lipopolysaccharide deep-rough core mutant grows and survives in mouse cecal mucus, but fails to colonize the mouse large intestine. *Infect. Immun.* **71**: 2142-2152. PMID: 12654836.
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54. Ma, Z., H. Richard, D. L. Tucker, T. Conway, and J. W. Foster. 2002. Collaborative regulation of *Escherichia coli* glutamate-dependent acid resistance by two AraC-like regulators, GadX and GadW. *J. Bacteriol.* **184**: 7001-7012. PMID: 12446650.

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