

BIOGRAPHICAL SKETCH

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NAME Minion, F. Chris		POSITION TITLE Professor of Veterinary Microbiology	
eRA COMMONS USER NAME (credential, e.g., agency login) fcminion			
EDUCATION/TRAINING (Begin with baccalaureate or other initial professional education, such as nursing, include postdoctoral training and residency training if applicable.)			
INSTITUTION AND LOCATION	DEGREE (if applicable)	MM/YY	FIELD OF STUDY
University of Memphis, Memphis, TN	B.S.	1968	Chemistry
University of Memphis, Memphis, TN	M.S.	1977	Cell Biology
University of Alabama at Birmingham, AL	Ph.D.	1983	Microbiology
Univ. Tenn. Ctr. Health Sci., Memphis, TN	Postdoc	1983-86	Bacterial Genetics

A. Research Interests

Dr. Minion's research interests focus on the molecular basis of bacterial pathogenesis and persistence of bacterial pathogens in domestic animals. Major emphasis is on pathogenomics, identification of virulence factors, gene profiling, and development of molecular vaccines. His laboratory studies the molecular basis of disease of *Mycoplasma hyopneumoniae* in swine, the molecular basis of biofilm formation in *Escherichia coli* O157:H7, and has a project developing vaccines against *Yersinia pestis*. Transcriptomics, proteomics and comparative genomics are being utilized to better understand gene regulation in mycoplasmas and its relationship to virulence.

B. Positions and Employment

2003-pres Professor, Vet Microbiol. Prev. Med., Iowa State University, Ames, IA.
1991-03 Associate Professor, Vet Microbiol. Prev. Med., Iowa State University, Ames, IA.
1986-91 Assistant Professor, Veterinary Medical Research Institute, Iowa State University, Ames, IA.
1983-85 Postdoc Fellow, Dept. of Microbiology and Immunology, University of Tennessee Center for the Health Sciences, Memphis, TN.
1978-83 Predoc Fellow, Dept. of Microbiol, University of Alabama in Birmingham, Birmingham, AL.
1978 Research Technician, Dept. of Biochem, St. Judes Children's Research Hospital, Memphis, TN.
1976-77 Teaching Assistant, Dept. of Biology, University of Memphis, Memphis, TN.

C. Selected Peer-Reviewed Publications. (Selected from a total of 99)

1. Minion, F. C., C. Adams, T. Hsu. 2000. R1 region of P97 mediates adherence of *Mycoplasma hyopneumoniae* to swine cilia. *Infect. Immun.* 68:3056-3060.
2. Hsu, T., D. L. Hutto, F. C. Minion, R. L. Zuerner, and M. J. Wannemuehler. 2001. Cloning of a beta-hemolysin gene of *Brachyspira (Serpulina) hyodysenteriae* and its expression in *Escherichia coli*. *Infect. Immun.* 69:706-711.
3. Menon, S. A. M., J. Wannemuehler, G. G. Mahairas, and F. C. Minion. 2002. Mycobacterial ESAT-6 protein enhances mouse interferon-g responses to *Mycoplasma hyopneumoniae* P71 protein. *J. Interf. Cytok. Res.* 22:807-813.
4. Minion, F. C. 2002. Molecular Pathogenesis of animal mycoplasma respiratory pathogens. *Front. Biosci.* 7: d1410-1422. URL: <http://www.bioscience.org/2002/v7/d/minion/fulltext.htm>.
5. Kurth, K.T., S.A. Menon, T. Hsu, D. Spencer and F. C. Minion. 2002. Cloning of a species-specific P75 protein gene from *Mycoplasma gallisepticum*. *Avian Dis.* 46:816-825.
6. Minion, F.C., S.A. Menon, G.G. Mahairas, and M.J. Wannemuehler. 2003. Enhanced murine antigen-specific IFN- γ responses using mycobacterial ESAT-6 sequences in DNA vaccines. *Infect. Immun.* 71:2239-2242.

7. Matic, J.N., J.L. Wilton, R.J. Towers, A.L. Scarman, F.C. Minion, M.J. Walker and S.P. Djordjevic. 2003. The pyruvate dehydrogenase complex of *Mycoplasma hyopneumoniae* contains a novel lipoyl domain arrangement. *Gene* 319:99-106.
8. Djordjevic, S. P., S. J. Cordwell, M. A. Djordjevic, J. Wilton, and F. C. Minion. 2004. Proteolytic processing of the *Mycoplasma hyopneumoniae* cilium adhesin. *Infect. Immun.* 72:2791-2802.
9. Waters, W.R., B.J. Nonnecke, M.V. Palmer, S. Robbe-Austermann, J.P. Bannantine, J.R. Stabel, D.L. Whipple, J.B. Payeur, D.M. Estes, J.E. Pitzer, and F.C. Minion. 2004. Use of recombinant ESAT-6:CFP-10 fusion protein for differentiation of infections of cattle by *Mycobacterium bovis* and by *M. avium* subsp. *avium* and *M. avium* subsp. *paratuberculosis*. *Clin. Diagn. Lab. Immunol.* 11:729-735.
10. Maue, A. C., R. W. Waters, M. V. Palmer, D. L. Whipple, F. C. Minion, W. C. Brown, and D. M. Estes. 2004. CD80 and CD86, but not CD154, augment DNA vaccine-induced protection in experimental bovine tuberculosis. *Vaccine* 23:769-779.
11. Minion, F. C., E. L. Lefkowitz, M. L. Madsen, B J. Cleary, S. M. Swartzell, and G. G. Mahairas. 2004. The genome sequence of *Mycoplasma hyopneumoniae* strain 232, the agent of swine mycoplasmosis. *J. Bacteriol.* 186:7123-7133.
12. Stakenborg, T., Vicca, J., Butaye, P., Maes, D., Minion, C., Peeters, J., de Kruif, A, Haesebrouck, F. 2005. Characterization of *in vivo* acquired resistance of *Mycoplasma hyopneumoniae* to macrolides and lincosamides. *Microbial Drug Resistance* 3:290-294.
13. Maue, A. C., W. C. Davis, M. V. Palmer, F. C. Minion, D. M. Estes, and W. R. Waters. 2005. Analysis of immune responses from *Mycobacterium bovis*-infected cattle directed toward a recombinant ESAT-6:CFP10 fusion protein. *Infect. Immun.* 73:6659-6667.
14. Adams, C., J. Pitzer, and F. C. Minion. 2005. *In vivo* expression analysis of the P97 and P102 paralog families of *Mycoplasma hyopneumoniae*. *Infect. Immun.* 73:7784-7787.
15. Madsen, M. L., D. Nettleton, E. L. Thacker, R. Edwards, and F. C. Minion. 2006. Transcriptional profiling of *Mycoplasma hyopneumoniae* during heat shock using microarrays. *Infect. Immun.* 74:167-174.
16. Jenkins, C., J. L. Wilton, F. C. Minion, L. Falconer, M. J. Walker, and S. P. Djordjevic. 2006. Two domains within the *Mycoplasma hyopneumoniae* cilium adhesin bind heparin. *Infect. Immun.* 74:481-487.
17. Waters, W. R., M. V. Palmer, R E. Slaughter, S. L. Jones, J. E. Pitzer, F. C. Minion. 2006. Diagnostic implications of antigen-induced gamma interferon production by blood leukocytes from *Mycobacterium bovis*-infected reindeer (*Rangifer tarandus*). *Clin. Vacc. Immunol.* 13:37-44.
18. Burnett, T.A., K. Dinkla, M. Rohde, G.S. Chhatwal, M. Srivastava, S.J. Cordwell, S. Geary, F. C. Minion, M. J. Walker, S. P. Djordjevic. 2006. P159 is a proteolytically processed, surface adhesin of *Mycoplasma hyopneumoniae*: defined domains of P159 bind heparin and promote adherence to eukaryotic cells. *Mol. Microbiol.* 60:669-686.
19. Madsen, M. L., D. Nettleton, E. L. Thacker, and F. C. Minion. 2006. Transcriptional profiling of *Mycoplasma hyopneumoniae* during iron depletion using microarrays. *Microbiology* 152:937-944.
20. Waters, W. R., Palmer, M. V., Thacker, T. C., Minion, F. C., and Davis, W. C. 2006. Antigen-specific proliferation and activation of peripheral blood mononuclear cells from *Mycobacterium bovis*-infected reindeer. *Vet. Immunol. Immunopathol.* 111:263-277.
21. Waters, W. R., M. V. Palmer, T. C. Thacker, J. B. Payeur, N. B. Harris, F. C. Minion, R. Greenwald, J. Esfandiari, P. Andersen, J. McNair, J. M. Pollock, and K. P. Lyashchenko. 2006. Immune responses to defined antigens of *Mycobacterium bovis* in cattle experimentally infected with *Mycobacterium kansasii*: potential interference with diagnostic tests for bovine tuberculosis. *Clin. Vacc. Immunol.* 13:611-619.
22. Maue, A. C., Waters, W. R., Palmer, M. V., Nonnecke, B. J., Minion, F. C., Brown, W. C., Norimine, J., Foote, M. R., Scherer, C. C. and Estes, M. D. 2007. An ESAT-6:CFP10 DNA vaccine administered in conjunction with *Mycobacterium bovis* BCG confers protection to cattle challenged with virulent *Mycobacterium bovis*. *Vaccine* (In press).
23. Schafer, E. R., M. J. Oneal, M. L. Madsen, F. C. Minion. 2007. Global transcriptional analysis of *Mycoplasma hyopneumoniae* following exposure to hydrogen peroxide. *Microbiol.* 153:3785-3790.
24. Madsen, M. L., M. J. Oneal, S. W. Gardner, E. L. Strait, D. Nettleton, E. L. Thacker, and F. C. Minion. 2007. Array-based genomic comparative hybridization of field strains of *Mycoplasma hyopneumoniae*. *J. Bacteriol.* 189:7977-7982.

25. Vicca, J., D. Maes, T. Stakenborg, P. Butaya, F. Minion, J. Peeters, A. De Kruif, A. Decostere, and F. Haesebrouck. 2007. Resistance mechanism against fluoroquinolones in *Mycoplasma hyopneumoniae* field isolates. *Microb. Drug Resist.* 13:166-170.
26. Madsen, M. L., S. Puttamreddy, E. L. Thacker, M. D. Carruthers, F. C. Minion. 2008. Transcriptome changes in *Mycoplasma hyopneumoniae* during infection. *Infect. Immun.* 76:658-663.
27. Chang, L.-J., W.-H. Chen, F. C. Minion and D. Shiuan. 2008. Mycoplasmas regulate the expression of heat shock protein genes through CIRCE-HrcA interactions. *Biochem. Biophys. Res. Commun.* 367:213-218.
28. Puttamreddy, S., M. D. Carruthers, M.; L. Madsen, and F. C. Minion. 2008. Transcriptome analysis of organisms with food safety relevance. *Foodborne Pathog. Dis.* 5:517-529.
29. Strait, E. L., M. L. Madsen, F. C. Minion, J. Christopher-Hennings, M. Dammen, K. R. Jones, E. L. Thacker. 2008. Real-time PCR assays to address genetic diversity in *Mycoplasma hyopneumoniae*. *J. Clin. Microbiol.* 46:2491-2498.
30. Oneal, M. J., E. R. Schafer, M. L. Madsen and F. C. Minion. 2008. Global Transcriptional Analysis of *Mycoplasma hyopneumoniae* Following Exposure to Norepinephrine. *Microbiol.* 154:2581-2588.
31. Wilton, J., C. Jenkins, S. Cordell, L. Falconer, F. Minion, D. Oneal, M. Djordjevic, A. Connolly, I. Barchia, M. Walker, and S. P. Djordjevic. 2009. Mhp493 (P216) is a proteolytically processed, cilium and heparin binding protein of *Mycoplasma hyopneumoniae*. *Mol. Micro.* 71: 566-582.
32. Carruthers, M. D., and F. C. Minion. Transcriptome analysis of *Escherichia coli* O157:H7 during heat shock. *FEMS Microbiol. Lett.* 295:96-102.
33. Waters, R.W., M.V. Palmer, B.J. Nonnecke, T.C. Thacker, D.M. Estes, M.H. Larsen, W.R. Jacobs, Jr., P. Andersen, J. McNair, F.C. Minion, K.P. Lyashchenko, R.G. Hewinson, H.M. Vordermeier, R.E. Sacco. 2009. Signal regulatory protein x03B1; (SIRPx03B1;)+ cells in the adaptive response to ESAT-6/CFP-10 protein of tuberculous mycobacteria. *PLoS ONE* [09-PONE-RA-10452R1]
34. Carrillo-Conde, E. Schilitz, J. Yu, F. C. Minion, G. J. Phillips, M. Wannemuehler, B. Narasimhan. 2010. Encapsulation into amphiphilic polyanhydride microparticles stabilizes *Yersinia pestis* antigens. *Acta Biomaterialia* 6:3110-3119.
35. Puttamreddy, S., N. A. Cornick, and F. C. Minion. 2010. Genome-wide transposon mutagenesis of *Escherichia coli* O157 EDL933 identifies pO157 genes involved in biofilm formation. *Infect. Immun.* 78:2377-2384.
36. Gardner, S. W. and F. C. Minion. 2010. Detection and quantification of intergenic transcription in *Mycoplasma hyopneumoniae*. *Microbiol.* 156: 2305-2315.
37. Carruthers, M. D., B. H. Bellaire, and F. C. Minion. 2010. Exploring the response of *Escherichia coli* O157:H7 EDL933 within *Acanthamoeba castellanii* by genome-wide transcriptional profiling. *FEMS Microbiol. Lett.* 312:15-23.
38. Deutscher, A. T., C. Jenkins, F. C. Minion, M. Padula, L. M. Seymour, N. E. Dixon, M. J. Walker, and S. P. Djordjevic. 2010. Repeat regions R1 and R2 in the P97 paralog Mhp271 of *Mycoplasma hyopneumoniae* bind heparin, fibronectin, and porcine cilia. *Mol. Micro.* 78:444-458.
39. Seymour, L. M., A. T. Deutscher, C. Jenkins, T. A. Kuit, L. Falconer, F. C. Minion , B. Crossett, M. Padula, N. E. Dixon, S. P. Djordjevic, M. J. Walker. 2010. A processed multidomain *Mycoplasma hyopneumoniae* adhesin binds fibronectin, plasminogen and swine respiratory cilia. *J. Biol. Chem.* 285:33971-33978. DOI/10.1074 /jbc.M110.104463.
40. Puttamreddy, S., and F. C. Minion. 2011. Linkage between cellular adherence and biofilm formation in *Escherichia coli* O157:H7 EDL933. *FEMS Microbiol. Lett.* 315: 46-53.
41. Seymour, L. M., L. Falconer, A. T. Deutscher, F. C. Minion, M. P. Padula, N. E. Dixon, S. P. Djordjevic and M. J. Walker. 2011. Mhp107 is a member of the multifunctional adhesin family of *Mycoplasma hyopneumoniae*. *J. Biol. Chem.* 286:10097-10104.
42. Kong, C. S., J. Yu, F. C. Minion, and K. Rajan. 2011. Identification of biologically significant genes from combinatorial microarray data. *ACS Combi. Sci.* 13:562-571.

43. Bogema, D. R., N. E. Scott, M. Padula, J. L. Tacchi, C. Jenkins, S. J. Cordwell, F. C. Minion, M. J. Walker, S. P. Djordjevic. 2011. The peptide sequence TTKF | QE defines the site of proteolytic cleavage in Mhp683 (P135), a novel glycosaminoglycan and cilium binding adhesin of *Mycoplasma hyopneumoniae*. *J. Biol. Chem.* 286:41217-41229.
44. Deutscher, A. T., J. L. Tacchi, F. C. Minion, M. P. Padual, B. Crossett, D. R. Bogema, C. Jenkins, M. J. Walker, S. P. Djordjevic. 2012. *Mycoplasma hyopneumoniae* surface proteins Mhp385 and Mhp384 bind host cilia and glycosaminoglycans and are endoproteolytically processed by proteases that recognize different cleavage motifs. *J. Proteome Res.* 11: 1924-1936.
45. Bogema, D. R., A. T. Deutscher, L. M. Seymour, B. B. A. Raymond, J. L. Tacchi, M. P. Padula, N. E. Dixon, F. C. Minion, C. Jenkins, M. J. Walker, and S. P. Djordjevic. 2012. Characterization of cleavage events in the multifunctional cilium adhesin Mhp684 (P146) reveals a novel mechanism by which *Mycoplasma hyopneumoniae* regulates surface topography. *mBio* 3: e00282-11.
46. Li, J., F. C. Minion, A. C. Petersen, F. Jiang, S. Yang, P. Guo, J. Li, and W. Wu. 2012. Loop-mediated isothermal amplification for rapid and convenient detection of *Mycoplasma hyopneumoniae*. *World J. Microbiol. Biotechnol.* DOI 10.1007/s11274-012-1216-x.
47. LaRock, C., J. Yu, A. R. Horswill, M. R. Parsek, and F. C. Minion. 2013. Transcriptome analysis of acetyl-homoserine lactone-based quorum sensing regulation in *Yersinia pestis*. *PLoS One* <http://dx.plos.org/10.1371/journal.pone.0062337>.
48. Yu, J., M. L. Madsen, M. D. Carruthers, G. J. Phillips, J. S. Kavanaugh, J. M. Boyd, A. R. Horswill, and F. C. Minion. 2013. Analysis of autoinducer-2 quorum sensing in *Yersinia pestis*. *Infect. Immun.* 81: 4053-4062.
49. Pendarvis, K. M. P. Padula, J. L. Tacchi, M. L. Madsen, S. P. Djordjevic, S. C. Burgess and F. C. Minion. 2013. Analysis of the proteome of *Mycoplasma hyopneumoniae* virulent strain 232. *BMC Genomics* (In press).
50. Raymond, B. B. A., J. L. Tacchi, V. M. Jarocki, F. C. Minion, M. P. Padula, S. P. Djordjevic. 2013. P159 from *Mycoplasma hyopneumoniae* binds porcine cilia and heparin and is cleaved by multiple proteases in a manner akin to ectodomain shedding. *J. Proteome Research* 12: 5891-5903.
51. Pendarvis, K., M. P. Padula, J. L. Tacchi, M. L. Madsen, S. P. Djordjevic, S. C. Burgess and F. C. Minion. 2014. Analysis of the proteome of *Mycoplasma hyopneumoniae* virulent strain 232. *BMC Genomics* 15:576.
52. Neto, J.C.G., E.L. Strait, M. Raymond, A. Ramirez, and F.C. Minion. 2014. Antibody responses of swine following infection with *Mycoplasma hyopneumoniae*, *M. hyorhinis*, *M. hyosynoviae* and *M. flocculare*. *Vet. Microbiol.* 174:163-171.
53. Register, K.B., L. Thole, R. F. Rosenbusch, and F.C. Minion. 2015. Multi-locus sequence typing of *Mycoplasma bovis* reveals host-specific genotypes in cattle versus bison *Vet. Microbiol.* 175:92-98.
54. Tacchi, J.L., B.A.R. Raymond, P.A. Haynes. I.J. Berry, M. Wisjaja, D.R. Bogema, L.K. Woolley, C. Jenkins, F.C. Minion, M.P. Padula, and S.P. Djordjevic. 2016. Post-translational processing targets functionally diverse proteins in *Mycoplasma hyopneumoniae*. *Open Biology* 6: 150210.