

2011-2012
Summary of Scholarly Activities
Department of Microbiology and Immunology

I. PUBLISHED JOURNAL ARTICLES, BOOK CHAPTERS, AND PATENTS

Aragon IV, Barrington RA, Jackowski S, Mori K, Brewer JW. The specialized unfolded protein response of B lymphocytes: ATF6 α -independent development of antibody-secreting B cells. *Mol Immunol*. 2012 Jul; 51(3-4):347-55.

Audia JP. Rickettsial physiology and metabolism in the face of reductive evolution. In: Azad A, Palmer G, editors. *Intracellular pathogens II: Rickettsiales*. Washington, DC: ASM Press; 2012. Chapter 7, p. 219-40.

Bartoszewski R, Brewer JW, Rab A, Crossman DK, Bartoszezewska S, Kapoor N, Fuller C, Collawn JF, Bebok Z. The unfolded protein response (UPR)-activated transcription factor x-box-binding protein 1 (XBP1) induces microRNA-346 expression that targets the human antigen peptide transporter 1 (TAP1) mRNA and governs immune regulatory genes. *J Biol Chem*. 2011 Dec 2; 286(48):41862-70.

Byrd AE, Aragon IV, Brewer JW. MicroRNA-30c-2* limits expression of proadaptive factor XBP1 in the unfolded protein response. *J Cell Biol*. 2012 Mar 19;196(6):689-98.

Coggin JH Jr, Barsoum AL, Rohrer JW, Schwarzenberger PO. The immunobiology of 37kDa oncofetal antigen/immature laminin receptor protein - a universal tumor immunogen. In: Rizk B, Sallam HN, editors. *Clinical infertility and In Vitro fertilization*. London, Jaypee Brothers Medical Publishers 2012. Chapter 36, p. 305-15.

Fortwendel JR, Juvvadi PR, Rogg LE, Asfaw YG, Burns KA, Randell SH, Steinbach WJ. Plasma membrane localization is required for RasA-mediated polarized morphogenesis and virulence of *Aspergillus fumigatus*. *Eukaryot Cell*. 2012 Aug;11(8):966-77.

Heiss C, Burtnick MN, Wang Z, Azadi P, Brett PJ. Structural analysis of capsular polysaccharides expressed by *Burkholderia mallei* and *Burkholderia pseudomallei*. *Carbohydr Res*. 2012 Feb;349:90-4.

Juvvadi PR, Fortwendel JR, Rogg LE, Burns KA, Randell SH, Steinbach WJ. Localization and activity of the calcineurin catalytic and regulatory subunit complex at the septum is essential for hyphal elongation and proper septation in *Aspergillus fumigatus*. *Mol Microbiol*. 2011 Dec;82(5):1235-59.

Rogg LE, Fortwendel JR, Juvvadi PR, Steinbach WJ. Regulation of expression, activity and localization of fungal chitin synthases. *Med Mycol*. 2012 Jan;50(1):2-17.

Rogg LE, Fortwendel JR, Juvvadi PR, Lilley A, Steinbach, WJ. The chitin synthases genes *chsA* and *chsC* are not required for cell wall stress responses in the human pathogen *Aspergillus fumigatus*. *Biochem Biophys Res Commun*. 2011 Aug 5;411(3):529-54.

Wood DO, Hines A, Tucker AM, Woodard A, Driskell LO, Burkhardt NY, Kurtti TJ, Baldrige GD, Munderloh UG. Establishment of a replicating plasmid in *Rickettsia prowazekii*. *PLoS One*. 2012;7(4):e34715. Available from: <http://www.plosone.org/article/info%3Adoi%2F10.1371%2Fjournal.pone.0034715>

Xin W, Yang X, Rich TC, Kreig T, Barrington R, Cohen MV, Downey JM. All preconditioning-related G protein-coupled receptors can be demonstrated in the rabbit cardiomyocyte. *J Cardiovasc Pharmacol Ther*. 2012 Jun;17(2):190-8.

II. PUBLISHED ABSTRACTS

Brett PJ, Gherardini FC, Burtnick MN. Interactions of *Burkholderia pseudomallei* type III secretion mutants with murine macrophages. Banff Conference on Infectious Diseases; 2012 May 15-19; Banff, Alberta, Canada. Abstract no. A-7.

Buhlmann J, Wang X, Bartlett A, Stone J, Lim B, Barrington RA. Defective homeostatic expansion leads to loss of B cell tolerance in germinal centers of *rasgrp1*-deficient mice. *Immunology 2012: 99th Annual American Association of Immunologists*; 2012 May 4-8; Boston, MA. Abstract no. 1338790.

Burtnick MN, Heiss C, Azadi P, Brett PJ. Development of capsular polysaccharide-based glycoconjugates for immunization against melioidosis and glanders. Pacific Southwest Regional Center of Excellence for Biodefense and Emerging Infectious Diseases Research, Eighth Annual Meeting; 2012 Jul 29-31; Olympic Valley, CA. Abstract no. 4.

Byrd AE, Aragon IV, Brewer JW. MicroRNA-30c-2* limits expression of pro-survival transcription factor XBP1 in the unfolded protein response. *Select Biosciences Conference Genomics Research 2012: RNAi and miRNA Track*; 2012 Apr 19-20; Boston, MA. Abstract no. 5.

Dillon M, Nuti DE, Brett PJ, Burtnick MN, AuCoin DP. Development of a mAb library targeting the capsular polysaccharide of *Burkholderia pseudomallei*. Pacific Southwest Regional Center of Excellence for Biodefense and Emerging Infectious Diseases Research, Eighth Annual Meeting; 2012 Jul 29-31; Olympic Valley, CA. Abstract no. 6.

Fitzgerald M, Housley N, Audia J, Alvarez D. Caspase 1 activation prevents pulmonary microvascular endothelial cell barrier disruption during infection with *Pseudomonas aeruginosa*. *Am J Respir Crit Care Med*. 2012 May 1;185:A5519. Available from: http://ajrccm.atsjournals.org/cgi/reprint/185/1_MeetingAbstracts/A5519

Fortwendel JR. Conserved and unique protein domains regulate *Aspergillus fumigatus* RasA localization and function during invasive growth. 112th American Society for Microbiology General Meeting; 2012 Jun 17; San Francisco, CA. Abstract no. 836.

Heiss C, Burtnick MN, Wang Z, Azadi P, Brett PJ. Structural analysis of capsular polysaccharides expressed by *Burkholderia mallei* and *Burkholderia pseudomallei*. European Melioidosis Network Meeting; 2012 Feb 24; Amsterdam, Netherlands. Abstract no. 10.

Heiss C, Burtnick MN, Wang Z, Azadi P, Brett PJ. *Burkholderia mallei* and *Burkholderia pseudomallei*-co-express two unique homopolymeric capsular polysaccharides. Banff Conference on Infectious Diseases; 2012 May 15-19; Banff Alberta, Canada. Abstract no. A-18.

Nuti DE, Crump RB, Handayani FD, Chantratita N, Peacock SJ, Bowen R, Felgner PL, Davies DH, Wu T, Lyons CR, Brett PJ, Burtnick MN, Kozel TR, AuCoin DP. Antigen-capture immunoassay for the diagnosis of melioidosis. European Melioidosis Network Meeting; 2012 Feb 24; Amsterdam, Netherlands. Abstract no. 31.

Reed D, Chantratita N, Peacock SJ, Burtnick MN, Brett PJ, Raychaudhuri S, Houghton R, Kozel TR, AuCoin DP. Construction of a lateral flow immunoassay for the diagnosis of melioidosis. 10th ASM Biodefense and Emerging Diseases Research Meeting; 2012 Feb 26-29; Washington, DC. p. 83. Abstract no. 232.

Tucker A, Wood DO, Roy CR. RpRalF: A secreted effector of *Rickettsia prowazekii*. 25th Meeting of the American Society for Rickettsiology; 2012 Jul 29, Park City, UT. Abstract no. 44. Available from: http://www.vet.k-state.edu/CE/ASR/ASR_Meeting_Abstracts.pdf

III. PUBLISHED BOOKS

Slonczewski JL and Foster JW. *Mikrobiologie: eine wissenschaft mit zukunft*. 2nd ed. Berlin: Springer Spectrum; 2012, 1425 p.

IV. INVITED PRESENTATIONS

Audia JP. Invited speaker. The obligate intracellular pathogen as the ultimate cell biologist. University of Calgary; 2011 Oct 11; Calgary, Alberta, Canada.

Brett PJ. Invited speaker. Development of glycoconjugate vaccines for immunization against melioidosis and glanders. Department of Infection, Immunity and Inflammation, University of Leicester; 2012 Feb 29; Leicester, UK.

Brett PJ. Invited speaker. Development of glycoconjugate vaccines for immunization glanders. Defense Science & Technology Laboratory, Porton Down; 2012 Mar 2; Salisbury, UK.

Brett PJ. Invited speaker. Development of glycoconjugate vaccines for immunization against melioidosis and glanders. Sanford School of Medicine, University of South Dakota; 2012 Mar 30; Vermillion, SD.

Brett PJ. Invited speaker. Molecular insights into the pathogenesis of melioidosis and glanders. Banff Conference on Infectious Diseases; 2012 May 15; Banff, Alberta, Canada.

Brett PJ. Invited speaker. Molecular insights into the pathogenesis of melioidosis and glanders. Laboratory of Zoonotic Pathogens, Rocky Mountain Laboratories, NIAID, NIH; 2012 Jun 20; Hamilton, MT.

Brett PJ. Invited speaker. Development of glycoconjugate vaccines for immunization against melioidosis and glanders. Pacific Southwest Regional Center of Excellence for Biodefense and Emerging Infectious Diseases Research, Eighth Annual Meeting; 2012 Jul 31; Olympic Valley, CA.

Burtnick MN. Invited speaker. Interactions of *Burkholderia mallei* and *Burkholderia pseudomallei* with phagocytic cells. Department of Infection, Immunity and Inflammation, University of Leicester; 2012 Feb 29; Leicester, UK.

Burtnick MN. Invited speaker. Interactions of *Burkholderia mallei* and *Burkholderia pseudomallei* with phagocytic cells. Defense Science & Technology Laboratory, Porton Down; 2012 Mar 2; Salisbury, UK.

Burtnick MN. Invited speaker. Influence of *Burkholderia mallei* T6SS-1 on host-pathogen interactions. Laboratory of Zoonotic Pathogens, Rocky Mountain Laboratories, NIAID, NIH; 2012 Jun 22; Hamilton, MT.

Burtnick MN. Invited speaker. Insights into the complex regulation of *Burkholderia mallei* T6SS-1. Pacific Southwest Regional Center of Excellence for Biodefense and Emerging Infectious Diseases Research, Eighth Annual Meeting; 2012 Jul 30; Olympic Valley, CA.

V. NATIONAL PROFESSIONAL RECOGNITION

Jonathon P. Audia: Review Editor, *Frontiers in Cellular and Infection Microbiology*. Ad Hoc Reviewer, *PLoS Pathogens*, *Clinica Chimica Acta*, *FEMS Immunology and Medical Microbiology*. Ad Hoc grant reviewer, Graduate Women in Science Fellowship.

Robert A. Barrington: Review Editor, *Frontiers in B Cell Biology*. Ad Hoc Reviewer, *European Journal of Immunology*.

Paul J. Brett: Ad Hoc Reviewer, *Applied and Environmental Microbiology*, *BMC Veterinary Research*, *Central European Journal of Biology*, *Clinical and Vaccine Immunology*, *FEMS Microbiology Letters*, *Infection and Immunity*, *Journal of Clinical*

Microbiology, Journal of Proteome Research, Microbial Pathogenesis, Molecular Microbiology, PLoS One.

Joseph W. Brewer: Ad Hoc Reviewer, *Journal of Immunology, Nature Immunology, Journal of Cellular Biochemistry, Oncogene*; Ad Hoc Grant Reviewer, United States Israel Binational Science Foundation.

Mary N. Burtnick: Ad Hoc Peer Reviewer, *BMC Genomics, Clinical and Vaccine Immunology, Frontiers in Cellular and Infection Microbiology, Infection and Immunity.*

Jarrold R. Fortwendel: Ad Hoc Reviewer, *Eukaryotic Cell, PLoS One.*

John W. Foster: Reviewer, *Science, Nucleic Acids Research, Journal of Bacteriology, Microbiology, Molecular Microbiology, Chemical and Engineering News, Microbiology and Immunology.*

David O. Wood: Chair, American Society for Microbiology (ASM) Membership Committee; Member, ASM Committee on Ethics; Editorial Board, ASM's *Infection and Immunity*; Member, Association of Microbiology and Immunology Chairs. Ad Hoc Reviewer, *Journal of Applied and Environmental Microbiology, Journal of Bacteriology, PLoS One, and PLoS Pathogens.*

VI. BRIEF SUMMARY OF ACTIVITIES AND PROGRESS

This year's departmental report is dedicated to Dr. James Rohrer, who passed away unexpectedly October 25, 2011. Jim dedicated 31 years of service to the Department and contributed substantially to our teaching and service commitments. His final publication is included in this report. Jim's collaborative research with former Chair, Dr. Joseph Coggin (deceased) and Dr. Adel Barsoum led to clinical trials of an oncofetal antigen cancer vaccine. His death was a great loss to our department and to advances in cancer research.

Two departmental students, Dr. Amanda Beaster and Dr. Aimee Tucker completed their dissertations under the direction of Dr. Wood and received Ph.D. degrees this year. Dr. Beaster is currently a Research Associate at MMS Holdings Inc. a pharmaceutical service organization that focuses on regulatory submission support for the pharmaceutical, biotech and medical device industries. Dr. Tucker currently holds a postdoctoral position in Dr. Wood's laboratory.

Dr. Terrence Tumpey, Senior Microbiologist and Team Leader of the Influenza Division at the Centers for Disease Control and one of the Department's former students (Ph.D. 1997) received the University of South Alabama Distinguished Alumni award.

Drs. Audia, Brett, Burtnick, and Wood, along with colleagues (Drs. Scammell and Schuler) in the Department of Comparative Medicine, continue contributing to construction plan development for the Laboratory of Infectious Diseases (LID) funded by

a C06 grant. This grant provided \$14,506,327 for the construction of a 25,800 square foot BSL2/BSL3 laboratory building. The LID is scheduled to be completed by Fall, 2013.

The Department's research programs remain a major focus of faculty activities. Examining the molecular mechanism underlying the pathogenicity of the Biosafety Level 3 (BSL-3) intracellular pathogens *Rickettsia prowazekii*, *Burkholderia mallei* and *Burkholderia pseudomallei*, conducted by Drs. Audia, Brett, Burtnick and Wood, represents a major area of research within the department.

The bacterial pathogen group also includes Dr. Foster who continues his work on the physiology and genetics of enteric pathogens. This group is complemented by Dr. Fortwendel who focuses on deciphering the pathogenic mechanisms of the fungal pathogen *Aspergillus fumigates*. The departmental Immunology group, consisting of Drs. Barrington and Brewer, focuses on examining the regulation of B cell fate and the unfolded protein response of cells under stress. Despite the problems facing NIH funding, departmental investigators continue to be productive and to actively pursue support for their research efforts. Five faculty members currently have extramural funding.

The Department remains committed to excellence in teaching. All of the faculty are contributing to the new medical curriculum and are doing double duty this Fall as participants in the 39th and final traditional Medical Microbiology and Immunology course. Dr. Foster continues to serve as course director for this course. Drs. Foster and Brewer have been especially active as effective leaders in course development and organization of departmental contributions to the new curriculum, and in the generation of team-based learning (TBL) exercises. The departmental transition to a TBL approach that incorporates case studies and correlations presented by our clinical colleagues began before establishment of the new curriculum and has been an effective addition to our teaching efforts in the area of infectious diseases and host response.

In the graduate program, faculty members also participated in the interdisciplinary graduate level courses IDL 580 and IDL 581. The Department is in the process of developing a new graduate training track to be designated Infectious Diseases and Host Defense.

Drs. Barrington, Brewer, Cioffi and Lin organized the Host Defense and Human Disease Group.

Dr. Brewer was appointed as Director of the Basic Medical Science Interdisciplinary Graduate Program.

The Department hosted two scientists for the Distinguished Scientist Seminar Series who presented outstanding seminars and met with the departmental faculty and students. Alfredo Torres, Ph.D., associate professor and co-director of BSL-3 Labs for the microbiology and immunology and pathology department at the University of Texas

Medical Branch in Galveston, Texas presented a seminar entitled "To see Burkholderia Mallei, or not to cure glanders, that is the host question." Kathryn Haskins, Ph.D. a professor of Immunology from Integrated Department of Immunology, National Jewish Health and University of Colorado Denver School of Medicine Anschutz Medical Campus, Denver, Colorado presented a seminar entitled "Pathogenic CD4T cells in type 1 diabetes and their autoantigens."