

TABLE OF CONTENTS

SPOTLIGHT

- Articles of Significant Interest Selected from This Issue by the Editors 1

MINIREVIEW

- What Is a Host? Incorporating the Microbiota into the Damage-Response Framework Arturo Casadevall, Liise-anne Pirofski 2–7

MOLECULAR PATHOGENESIS

- Ethanol-Induced Alcohol Dehydrogenase E (AdhE) Potentiates Pneumolysin in *Streptococcus pneumoniae* Truc Thanh Luong, Eun-Hye Kim, Jong Phil Bak, Cuong Thach Nguyen, Sangdun Choi, David E. Briles, Suhkneung Pyo, Dong-Kwon Rhee 108–119

- Accumulation-Associated Protein Enhances *Staphylococcus epidermidis* Biofilm Formation under Dynamic Conditions and Is Required for Infection in a Rat Catheter Model Carolyn R. Schaeffer, Keith M. Woods, G. Matt Longo, Megan R. Kiedrowski, Alexandra E. Paharik, Henning Büttner, Martin Christner, Robert J. Boissy, Alexander R. Horswill, Holger Rohde, Paul D. Fey 214–226

- Peroxiredoxin-Glutaredoxin and Catalase Promote Resistance of Nontypeable *Haemophilus influenzae* 86-028NP to Oxidants and Survival within Neutrophil Extracellular Traps Richard A. Juneau, Bing Pang, Chelsie E. Armbruster, Kyle A. Murrah, Antonia C. Perez, W. Edward Swords 239–246

- Host Intestinal Signal-Promoted Biofilm Dispersal Induces *Vibrio cholerae* Colonization Amanda J. Hay, Jun Zhu 317–323

- Control of Acid Resistance Pathways of Enterohemorrhagic *Escherichia coli* Strain EDL933 by PsrB, a Prophage-Encoded AraC-Like Regulator Ji Yang, Thomas W. Russell, Dianna M. Hocking, Jennifer K. Bender, Yogitha N. Srikhanta, Marija Tauschek, Roy M. Robins-Browne 346–353

- The Polyamine *N*-Acetyltransferase-Like Enzyme PmvE Plays a Role in the Virulence of *Enterococcus faecalis* Cecilia Martini, Charlotte Michaux, Francesca Bugli, Alessandro Arcovito, Federica Iavarone, Margherita Cacaci, Francesco Paroni Sterbini, Axel Hartke, Nicolas Sauvageot, Maurizio Sanguinetti, Brunella Posteraro, Jean-Christophe Giard 364–371

- Gastrointestinal Dissemination and Transmission of *Staphylococcus aureus* following Bacteremia Elisabeth Kernbauer, Katie Maurer, Victor J. Torres, Bo Shopsis, Ken Cadwell 372–378

- The Two-Component System GrvRS (EtaRS) Regulates *ace* Expression in *Enterococcus faecalis* OG1RF Jung Hyeob Roh, Kavindra V. Singh, Sabina Leanti La Rosa, Ana Luisa V. Cohen, Barbara E. Murray 389–395

CELLULAR MICROBIOLOGY: PATHOGEN-HOST CELL MOLECULAR INTERACTIONS

- Susceptibility to *Plasmodium yoelii* Preerythrocytic Infection in BALB/c Substrains Is Determined at the Point of Hepatocyte Invasion Alexis Kaushansky, Laura S. Austin, Sebastian A. Mikolajczak, Fang Y. Lo, Jessica L. Miller, Alyse N. Douglass, Nadia Arang, Ashley M. Vaughan, Malcolm J. Gardner, Stefan H. I. Kappe 39–47

A <i>Moraxella catarrhalis</i> Two-Component Signal Transduction System Necessary for Growth in Liquid Media Affects Production of Two Lysozyme Inhibitors	Stephanie N. Joslin, Christine Pybus, Maria Labandeira-Rey, Amanda S. Evans, Ahmed S. Attia, Chad A. Brautigam, Eric J. Hansen	146–160
<i>Bordetella pertussis</i> Naturally Occurring Isolates with Altered Lipooligosaccharide Structure Fail To Fully Mature Human Dendritic Cells	Jolanda Brummelman, Rosanne E. Veerman, Hendrik Jan Hamstra, Anna J. M. Deuss, Tim J. Schuijt, Arjen Sloots, Betsy Kuipers, Cécile A. C. M. van Els, Peter van der Ley, Frits R. Mooi, Wanda G. H. Han, Elena Pinelli	227–238
Macrophage Polarization Drives Granuloma Outcome during <i>Mycobacterium tuberculosis</i> Infection	Simeone Marino, Nicholas A. Cilfone, Joshua T. Mattila, Jennifer J. Linderman, JoAnne L. Flynn, Denise E. Kirschner	324–338
Late Establishment of the Attaching and Effacing Lesion Caused by Atypical Enteropathogenic <i>Escherichia coli</i> Depends on Protein Expression Regulated by Per	Vanessa Bueris, Jazmín Huerta-Cantillo, Fernando Navarro-Garcia, Renato M. Ruiz, Aurora M. Cianciarullo, Waldir P. Elias	379–388
BACTERIAL INFECTIONS		
Genome-Wide Evaluation of the Interplay between <i>Caenorhabditis elegans</i> and <i>Yersinia pseudotuberculosis</i> during <i>In Vivo</i> Biofilm Formation	George W. P. Joshua, Steve Atkinson, Robert J. Goldstone, Hannah L. Patrick, Richard A. Stabler, Joanne Purves, Miguel Cámara, Paul Williams, Brendan W. Wren	17–27
Effects of Shiga Toxin Type 2 on a Bioengineered Three-Dimensional Model of Human Renal Tissue	Teresa M. DesRochers, Erica Palma Kimmerling, Dakshina M. Jandhyala, Wassim El-Jouni, Jing Zhou, Cheleste M. Thorpe, John M. Leong, David L. Kaplan	28–38
<i>In Vivo</i> Mechanisms Involved in Enhanced Protection Utilizing an Fc Receptor-Targeted Mucosal Vaccine Platform in a Bacterial Vaccine and Challenge Model	Constantine Bitsaktis, Zulfia Babadjanova, Edmund J. Gosselin	77–89
Oral Streptococci and Nitrite-Mediated Interference of <i>Pseudomonas aeruginosa</i>	Jessica A. Scoffield, Hui Wu	101–107
The Conserved Hypothetical Protein Rv0574c Is Required for Cell Wall Integrity, Stress Tolerance, and Virulence of <i>Mycobacterium tuberculosis</i>	Rajni Garg, Deeksha Tripathi, Sashi Kant, Harish Chandra, Rakesh Bhatnagar, Nirupama Banerjee	120–129
Expression of Enteropathogenic <i>Escherichia coli</i> Map Is Significantly Different than That of Other Type III Secreted Effectors <i>In Vivo</i>	Mai Nguyen, Jason Rizvi, Gail Hecht	130–137
Importance of Branched-Chain Amino Acid Utilization in <i>Francisella</i> Intracellular Adaptation	Gael Gesbert, Elodie Ramond, Fabiola Tros, Julien Dairou, Eric Frapy, Monique Barel, Alain Charbit	173–183
Plasmid-Encoded MCP Is Involved in Virulence, Motility, and Biofilm Formation of <i>Cronobacter sakazakii</i> ATCC 29544	Younho Choi, Seongok Kim, Hyelyeon Hwang, Kwang-Pyo Kim, Dong-Hyun Kang, Sangryeol Ryu	197–204
Lymphocytes Modulate Innate Immune Responses and Neuronal Damage in Experimental Meningitis	Olaf Hoffmann, Olga Rung, Josephin Held, Chotima Boettcher, Stefan Prokop, Werner Stenzel, Josef Priller	259–267

Adenovirus Vector Expressing Stx1/Stx2-Neutralizing Agent Protects Piglets Infected with <i>Escherichia coli</i> O157:H7 against Fatal Systemic Intoxication	Abhineet S. Sheoran, Igor P. Dmitriev, Elena A. Kashentseva, Ocean Cohen, Jean Mukherjee, Michelle Debatis, Jonathan Shearer, Jacqueline M. Tremblay, Gillian Beamer, David T. Curiel, Charles B. Shoemaker, Saul Tzipori	286–291
New Iron Acquisition System in <i>Bacteroidetes</i>	Pablo Manfredi, Frédéric Lauber, Francesco Renzi, Katrin Hack, Estelle Hess, Guy R. Cornelis	300–310
Host Hydrogen Rather than That Produced by the Pathogen Is Important for <i>Salmonella enterica</i> Serovar Typhimurium Virulence	Reena Lamichhane-Khadka, Stéphane L. Benoit, Erica F. Miller-Parks, Robert J. Maier	311–316
<i>Enterococcus faecalis</i> 6-Phosphogluconolactonase Is Required for Both Commensal and Pathogenic Interactions with <i>Manduca sexta</i>	Jonathan F. Holt, Megan R. Kiedrowski, Kristi L. Frank, Jing Du, Changhui Guan, Nichole A. Broderick, Gary M. Dunny, Jo Handelsman	396–404
Toxin-Mediated Paracellular Transport of Antitoxin Antibodies Facilitates Protection against <i>Clostridium difficile</i> Infection	Z. Zhang, X. Chen, L. D. Hernandez, P. Lipari, A. Flattery, S.-C. Chen, S. Kramer, J. D. Polishook, F. Racine, H. Cape, C. P. Kelly, A. G. Therien	405–416
Contribution of <i>Veillonella parvula</i> to <i>Pseudomonas aeruginosa</i>-Mediated Pathogenicity in a Murine Tumor Model System	Christian Pustelny, Uliana Komor, Vinay Pawar, Anne Lorenz, Agata Bielecka, Annette Moter, Benjamin Gocht, Denitsa Eckweiler, Mathias Müsken, Claudia Grothe, Heinrich Lünsdorf, Siegfried Weiss, Susanne Häussler	417–429
Antibody Response Specific to the Capsular Polysaccharide Is Impaired in <i>Streptococcus suis</i> Serotype 2-Infected Animals	Cynthia Calzas, Paul Lemire, Gael Auray, Volker Gerds, Marcelo Gottschalk, Mariela Segura	441–453
HOST RESPONSE AND INFLAMMATION		
Macrophages Are the Determinant of Resistance to and Outcome of Nonlethal <i>Babesia microti</i> Infection in Mice	Mohamad Alaa Terkawi, Shinuo Cao, Maria S. Herbas, Maki Nishimura, Yan Li, Paul Franck Adjou Moumouni, Asadullah Hamid Pyarokhil, Daisuke Kondoh, Nobuo Kitamura, Yoshifumi Nishikawa, Kentaro Kato, Naoaki Yokoyama, Jinlin Zhou, Hiroshi Suzuki, Ikuo Igarashi, Xuenan Xuan	8–16
CD4⁺ T Cells Promote Antibody Production but Not Sustained Affinity Maturation during <i>Borrelia burgdorferi</i> Infection	Rebecca A. Elsner, Christine J. Hasteley, Nicole Baumgarth	48–56
Persistence and Toxin Production by <i>Clostridium difficile</i> within Human Intestinal Organoids Result in Disruption of Epithelial Paracellular Barrier Function	Jhansi L. Leslie, Sha Huang, Judith S. Opp, Melinda S. Nagy, Masayuki Kobayashi, Vincent B. Young, Jason R. Spence	138–145
Macrophage-Inducible C-Type Lectin Mincle-Expressing Dendritic Cells Contribute to Control of Splenic <i>Mycobacterium bovis</i> BCG Infection in Mice	Friederike Behler, Regina Maus, Jennifer Bohling, Sarah Knippenberg, Gabriele Kirchhof, Masahiro Nagata, Danny Jonigk, Nicole Izykowski, Lavinia Mägel, Tobias Welte, Sho Yamasaki, Ulrich A. Maus	184–196

CFP-10 from <i>Mycobacterium tuberculosis</i> Selectively Activates Human Neutrophils through a Pertussis Toxin-Sensitive Chemotactic Receptor	Amanda Welin, Halla Björnsdóttir, Malene Winther, Karin Christenson, Tudor Oprea, Anna Karlsson, Huamei Forsman, Claes Dahlgren, Johan Bylund	205–213
Intestinal Alkaline Phosphatase Deficiency Leads to Lipopolysaccharide Desensitization and Faster Weight Gain	Ye Yang, José Luis Millán, Joan Mecas, Karen Guillemin	247–258
Sterilizing Immunity Elicited by <i>Neisseria meningitidis</i> Carriage Shows Broader Protection than Predicted by Serum Antibody Cross-Reactivity in <i>CEACAM1</i> -Humanized Mice	Kay O. Johswich, Shannon E. McCaw, Lea Strobel, Matthias Frosch, Scott D. Gray-Owen	354–363
Neutralization of Mitochondrial Superoxide by Superoxide Dismutase 2 Promotes Bacterial Clearance and Regulates Phagocyte Numbers in Zebrafish	E. M. Peterman, C. Sullivan, M. F. Goody, I. Rodriguez-Nunez, J. A. Yoder, C. H. Kim	430–440
FUNGAL AND PARASITIC INFECTIONS		
<i>Leishmania major</i> Telomerase TERT Protein Has a Nuclear/Mitochondrial Eclipsed Distribution That Is Affected by Oxidative Stress	Riward Campelo, Isabel Díaz Lozano, Katherine Figarella, Antonio Osuna, José Luis Ramírez	57–66
Transgenic Expression of CXCR3 on T Cells Enhances Susceptibility to Cutaneous <i>Leishmania major</i> Infection by Inhibiting Monocyte Maturation and Promoting a Th2 Response	Steve Oghumu, James C. Stock, Sanjay Varikuti, Ran Dong, Cesar Terrazas, Jessica A. Edwards, Chad A. Rappleye, Ariel Holovatyk, Arlene Sharpe, Abhay R. Satoskar	67–76
MICROBIAL IMMUNITY AND VACCINES		
Mucosal Immunization with the Live Attenuated Vaccine SPY1 Induces Humoral and Th2-Th17-Regulatory T Cell Cellular Immunity and Protects against Pneumococcal Infection	Xiuyu Xu, Hong Wang, Yusi Liu, Yiping Wang, Lingbing Zeng, Kaifeng Wu, Jianmin Wang, Feng Ma, Wenchun Xu, Yibing Yin, Xuemei Zhang	90–100
A Bivalent Typhoid Live Vector Vaccine Expressing both Chromosome- and Plasmid-Encoded <i>Yersinia pestis</i> Antigens Fully Protects against Murine Lethal Pulmonary Plague Infection	James E. Galen, Jin Yuan Wang, Jose A. Carrasco, Scott A. Lloyd, Gabriela Mellado-Sanchez, Jovita Diaz-McNair, Olga Franco, Amanda D. Buskirk, James P. Nataro, Marcela F. Pasetti	161–172
A Replicating Adenovirus Capsid Display Recombinant Elicits Antibodies against <i>Plasmodium falciparum</i> Sporozoites in <i>Aotus nancymaae</i> Monkeys	Kasey A. Karen, Cailin Deal, Robert J. Adams, Carolyn Nielsen, Cameron Ward, Diego A. Espinosa, Jane Xie, Fidel Zavala, Gary Ketner	268–275
Immune Characterization of <i>Plasmodium falciparum</i> Parasites with a Shared Genetic Signature in a Region of Decreasing Transmission	Amy K. Bei, Ababacar Diouf, Kazutoyo Miura, Daniel B. Larremore, Ulf Ribacke, Gregory Tullo, Eli L. Moss, Daniel E. Neafsey, Rachel F. Daniels, Amir E. Zeituni, Iguosadolo Nosamiefan, Sarah K. Volkman, Ambroise D. Ahouidi, Daouda Ndiaye, Tandakha Dieye, Souleymane Mboup, Caroline O. Buckee, Carole A. Long, Dyann F. Wirth	276–285
Impact of Detergent on Biophysical Properties and Immune Response of the IpaDB Fusion Protein, a Candidate Subunit Vaccine against <i>Shigella</i> Species	Xiaotong Chen, Shyamal P. Choudhari, Francisco J. Martinez-Becerra, Jae Hyun Kim, Nicholas E. Dickenson, Ronald T. Toth IV, Sangeeta B. Joshi, Jamie C. Greenwood II, John D. Clements, William D. Picking, C. Russell Middaugh, Wendy L. Picking	292–299

Recombinant ESAT-6-Like Proteins Provoke Protective Immune Responses against Invasive *Staphylococcus aureus* Disease in a Murine Model

Bao Zhong Zhang, Yan Hong Hua, Bin Yu, Candy Choi Yi Lau, Jian Piao Cai, Song Yue Zheng, Wing Cheong Yam, Richard Yi Tsun Kao, Kong Hung Sze, Bo Jian Zheng, Kwok Yung Yuen, Jian Dong Huang

339–345

ERRATUM

Erratum for Belmonte et al., Role of Pathogen-Derived Cell Wall Carbohydrates and Prostaglandin E₂ in Immune Response and Suppression of Fish Immunity by the Oomycete *Saprolegnia parasitica*

Rodrigo Belmonte, Tiehui Wang, Gary J. Duncan, Ida Skaar, Hugo Mérida, Vincent Bulone, Pieter van West, Christopher J. Secombes

454

Cover photograph (Copyright © 2015, American Society for Microbiology. All Rights Reserved.): (Center) Human intestinal organoids (HIOs) are three-dimensional spheroids derived from directed differentiation of pluripotent stem cells. HIOs have a complex epithelium, which recapitulates aspects of the human gastrointestinal tract. The epithelial cells of HIOs respond to cytokines, as treatment with tumor necrosis factor alpha and gamma interferon induces apoptosis (top left) while the calcium chelator EGTA does not (bottom right). Furthermore, HIOs can be colonized with anaerobic bacteria such as the gastrointestinal pathogen *Clostridium difficile*. Infection of HIOs with a toxigenic (bottom left) but not a nontoxigenic (bottom right) strain of *C. difficile* results in a disruption of the HIO epithelium. (See related article on page 138.)