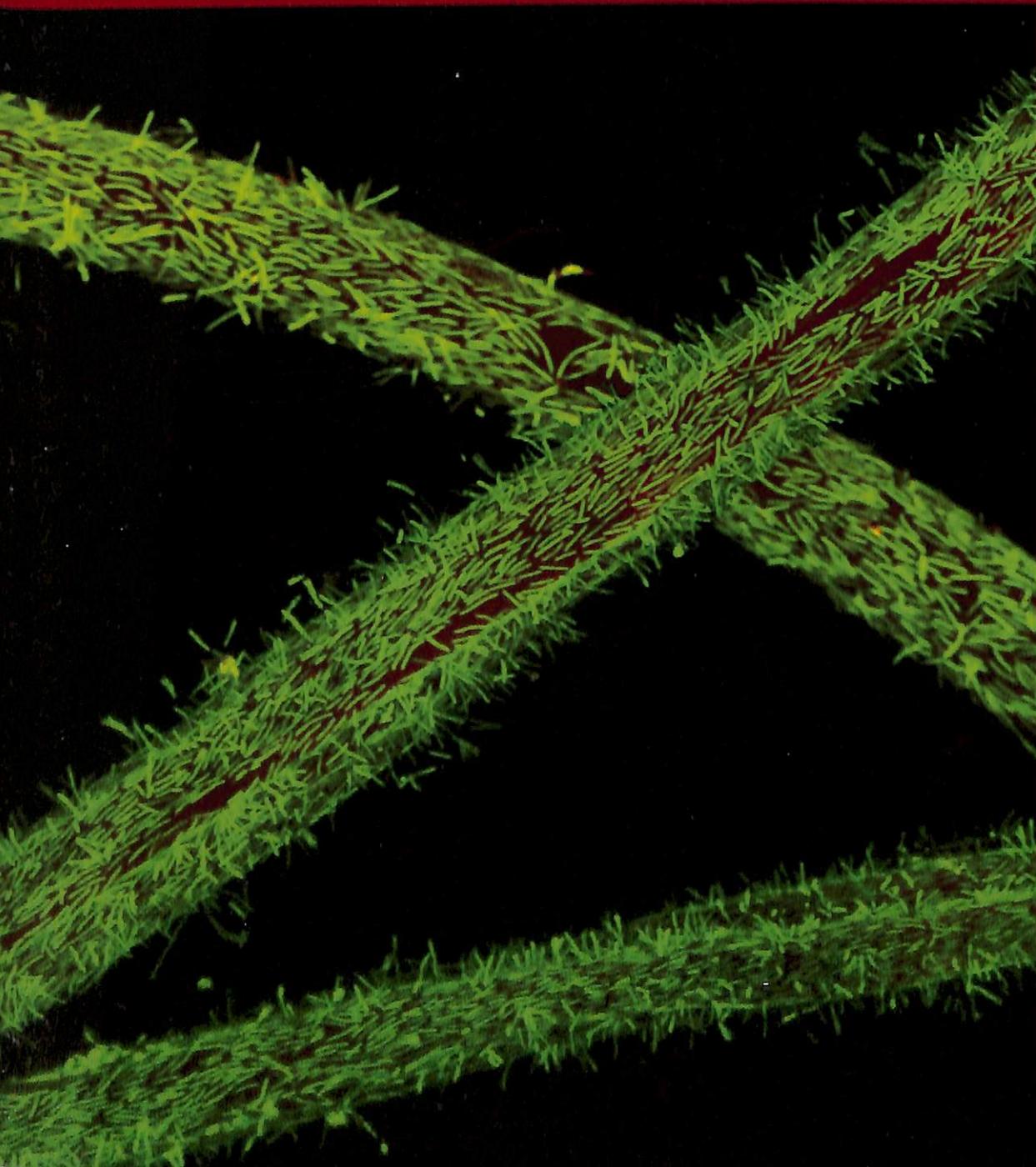


January 2013 • Volume 79 • Number 1

# AEM

**Applied and Environmental Microbiology**



published twice monthly by



AMERICAN  
SOCIETY FOR  
MICROBIOLOGY

## TABLE OF CONTENTS

### INSTRUCTIONS TO AUTHORS

2013 Instructions to Authors (<http://aem.asm.org/site/misc/ifora.xhtml>)

### SPOTLIGHT

Articles of Significant Interest Selected from This Issue by the Editors

1

### MINIREVIEW

Gut and Root Microbiota Commonalities

Shamayim T. Ramírez-Puebla, Luis E. Servín-Garcidueñas, Berenice Jiménez-Marín, Luis M. Bolaños, Mónica Rosenblueth, Julio Martínez, Marco Antonio Rogel, Ernesto Ormeño-Orrillo, Esperanza Martínez-Romero

2–9

### BIODEGRADATION

Comparing Metabolic Functionalities, Community Structures, and Dynamics of Herbicide-Degrading Communities Cultivated with Different Substrate Concentrations

Erkin Gözdereliler, Nico Boon, Jens Aamand, Karen De Roy, Michael S. Granitsiotis, Hans-Jørgen Albrechtsen, Sebastian R. Sørensen

367–375

*n*-Alkane Chain Length Alters *Dietzia* sp. Strain DQ12-45-1b Biosurfactant Production and Cell Surface Activity

Xing-Biao Wang, Yong Nie, Yue-Qin Tang, Gang Wu, Xiao-Lei Wu

400–402

### BIOTECHNOLOGY

Investigation of the *Amycolatopsis* sp. Strain ATCC 39116 Vanillin Dehydrogenase and Its Impact on the Biotechnical Production of Vanillin

Christian Fleige, Gunda Hansen, Jens Kröll, Alexander Steinbüchel

81–90

Ethanol Production and Maximum Cell Growth Are Highly Correlated with Membrane Lipid Composition during Fermentation as Determined by Lipidomic Analysis of 22 *Saccharomyces cerevisiae* Strains

Clark M. Henderson, Michelle Lozada-Contreras, Vladimir Jiranek, Marjorie L. Longo, David E. Block

91–104

Use of Proteomic Analysis To Elucidate the Role of Calcium in Acetone-Butanol-Ethanol Fermentation by *Clostridium beijerinckii* NCIMB 8052

Bei Han, Victor Ujor, Lien B. Lai, Venkat Gopalan, Thaddeus Chukwuemeka Ezeji

282–293

Engineering Signal Peptides for Enhanced Protein Secretion from *Lactococcus lactis*

Daphne T. W. Ng, Casim A. Sarkar

347–356

Increasing the Heme-Dependent Respiratory Efficiency of *Lactococcus lactis* by Inhibition of Lactate Dehydrogenase

Stefania Arioli, Daniele Zambelli, Simone Guglielmetti, Ivano De Noni, Martin B. Pedersen, Per Dedenroth Pedersen, Fabio Dal Bello, Diego Mora

376–380

### ENVIRONMENTAL MICROBIOLOGY

Community and Proteomic Analysis of Methanogenic Consortia Degrading Terephthalate

Jer-Horng Wu, Feng-Yau Wu, Hui-Ping Chuang, Wei-Yu Chen, Hung-Jen Huang, Shu-Hui Chen, Wen-Tso Liu

105–112

Gray Mold Populations in German Strawberry Fields Are Resistant to Multiple Fungicides and Dominated by a Novel Clade Closely Related to *Botrytis cinerea*

Michaela Leroch, Cecilia Plesken, Roland W. S. Weber, Frank Kauff, Gabriel Scalliet, Matthias Hahn

159–167

- Development of Quantitative PCR Assays Targeting the 16S rRNA Genes of *Enterococcus* spp. and Their Application to the Identification of *Enterococcus* Species in Environmental Samples** 196–204  
Hodon Ryu, Michael Henson, Michael Elk, Carlos Toledo-Hernandez, John Griffith, Denene Blackwood, Rachel Noble, Michèle Gourmelon, Susan Glassmeyer, Jorge W. Santo Domingo
- Development and Evaluation of EPA Method 1615 for Detection of Enterovirus and Norovirus in Water** 215–223  
Jennifer L. Cashdollar, Nichole E. Brinkman, Shannon M. Griffin, Brian R. McMinn, Eric R. Rhodes, Eunice A. Varughese, Ann C. Grimm, Sandhya U. Parshionikar, Larry Wymer, G. Shay Fout
- Bacterial Chitinolytic Communities Respond to Chitin and pH Alteration in Soil** 263–272  
Anna M. Kielak, Mariana Silvia Cretoiu, Alexander V. Semenov, Søren J. Sørensen, Jan Dirk van Elsas
- Identification of the Enzyme Responsible for N-Acetylation of Norfloxacin by *Microbacterium* sp. Strain 4N2-2** 314–321  
Dae-Wi Kim, Jinhui Feng, Huizhong Chen, Ohgew Kweon, Yuan Gao, Li-Rong Yu, Vanessa J. Burrowes, John B. Sutherland
- Seasonal Methane Oxidation Potential in Manure Crusts** 407–410  
Daniel A. Nielsen, Andreas Schramm, Lars P. Nielsen, Niels P. Revsbech
- ENZYMOLGY AND PROTEIN ENGINEERING**
- Expression and Characterization of a *Bifidobacterium adolescentis* Beta-Mannanase Carrying Mannan-Binding and Cell Association Motifs** 133–140  
Evelina Kulcinskaja, Anna Rosengren, Romany Ibrahim, Katarína Kolenová, Henrik Stålbbrand
- Biochemical Properties and Crystal Structure of a  $\beta$ -Phenylalanine Aminotransferase from *Variovorax paradoxus*** 185–195  
Ciprian G. Crismaru, Gjalt G. Wybenga, Wiktor Szymanski, Hein J. Wijma, Bian Wu, Sebastian Bartsch, Stefaan de Wildeman, Gerrit J. Poelarends, Ben L. Feringa, Bauke W. Dijkstra, Dick B. Janssen
- Identification of a Residue Affecting Fatty Alcohol Selectivity in Wax Ester Synthase** 396–399  
Brett M. Barney, Rachel L. Mann, Janet M. Ohlert
- EVOLUTIONARY AND GENOMIC MICROBIOLOGY**
- Genomic and Physiological Characterization of the Chromate-Reducing, Aquifer-Derived Firmicute *Pelosinus* sp. Strain HCF1** 63–73  
Harry R. Beller, Ruyang Han, Ulas Karaoz, HsiaoChien Lim, Eoin L. Brodie
- Exploration of the Genomic Diversity and Core Genome of the *Bifidobacterium adolescentis* Phylogenetic Group by Means of a Polyphasic Approach** 336–346  
Sabrina Duranti, Francesca Turrone, Christian Milani, Elena Foroni, Francesca Bottacini, Fabio Dal Bello, Alberto Ferrarini, Massimo Delledonne, Douwe van Sinderen, Marco Ventura
- FOOD MICROBIOLOGY**
- Effect of Frequency and Waveform on Inactivation of *Escherichia coli* O157:H7 and *Salmonella enterica* Serovar Typhimurium in Salsa by Ohmic Heating** 10–17  
Su-Yeon Lee, Sangryeol Ryu, Dong-Hyun Kang
- The Noncommensal Bacterium *Methylococcus capsulatus* (Bath) Ameliorates Dextran Sulfate (Sodium Salt)-Induced Ulcerative Colitis by Influencing Mechanisms Essential for Maintenance of the Colonic Barrier Function** 48–56  
Charlotte R. Kleiveland, Lene T. Olsen Hult, Signe Spetalen, Magne Kaldhusdal, Trine Eker Christoffersen, Oskar Bengtsson, Odd Helge Romarheim, Morten Jacobsen, Tor Lea
- Catalase Activity as a Biomarker for Mild-Stress-Induced Robustness in *Bacillus weihenstephanensis*** 57–62  
Heidy M. W. den Besten, Styliani Effraimidou, Tjakko Abee

Behavior of Different Shiga Toxin-Producing <i>Escherichia coli</i> Serotypes in Various Experimentally Contaminated Raw-Milk Cheeses	Stéphane D. Miszczycha, Frédérique Perrin, Sarah Ganet, Emmanuel Jamet, Fanny Tenenhaus-Aziza, Marie-Christine Montel, Delphine Thevenot-Sergentet	150–158
The <i>Salmonella</i> Transcriptome in Lettuce and Cilantro Soft Rot Reveals a Niche Overlap with the Animal Host Intestine	Danielle M. Goudeau, Craig T. Parker, Yaguang Zhou, Shlomo Sela, Yulia Kroupitski, Maria T. Brandl	250–262
<b>GENETICS AND MOLECULAR BIOLOGY</b>		
Carboxyethylarginine Synthase Genes Show Complex Cross-Regulation in <i>Streptomyces clavuligerus</i>	Thomas Kwong, Kapil Tahlan, Cecilia L. Anders, Susan E. Jensen	240–249
Autotransporter Protein-Encoding Genes of Diarrheagenic <i>Escherichia coli</i> Are Found in both Typical and Atypical Enteropathogenic <i>E. coli</i> Strains	Afonso G. Abreu, Vanessa Bueris, Tatiane M. Porangaba, Marcelo P. Sircili, Fernando Navarro-Garcia, Waldir P. Elias	411–414
<b>GEOMICROBIOLOGY</b>		
Elimination of Manganese(II,III) Oxidation in <i>Pseudomonas putida</i> GB-1 by a Double Knockout of Two Putative Multicopper Oxidase Genes	Kati Geszvain, James K. McCarthy, Bradley M. Tebo	357–366
<b>INVERTEBRATE MICROBIOLOGY</b>		
NeuroBactrus, a Novel, Highly Effective, and Environmentally Friendly Recombinant Baculovirus Insecticide	Hee Jin Shim, Jae Young Choi, Yong Wang, Xue Ying Tao, Qin Liu, Jong Yul Roh, Jae Su Kim, Woo Jin Kim, Soo Dong Woo, Byung Rae Jin, Yeon Ho Je	141–149
Phylogenetic, Metabolic, and Taxonomic Diversities Shape Mediterranean Fruit Fly Microbiotas during Ontogeny	Yael Aharon, Zohar Pasternak, Michael Ben Yosef, Adi Behar, Carol Lauzon, Boaz Yuval, Edouard Jurkevitch	303–313
Specific Detection and Localization of Microsporidian Parasites in Invertebrate Hosts by Using <i>In Situ</i> Hybridization	Aurore Dubuffet, Judith E. Smith, Leellen Solter, M. Alejandra Perotti, Henk R. Braig, Alison M. Dunn	385–388
<b>METHODS</b>		
Promoter Swapping Unveils the Role of the <i>Citrobacter rodentium</i> CTS1 Type VI Secretion System in Interbacterial Competition	Erwan Gueguen, Eric Cascales	32–38
Fluorometric Quantification of Polyphosphate in Environmental Plankton Samples: Extraction Protocols, Matrix Effects, and Nucleic Acid Interference	Patrick Martin, Benjamin A. S. Van Mooy	273–281
<b>MICROBIAL ECOLOGY</b>		
Lineage-Specific Responses of Microbial Communities to Environmental Change	Nicholas D. Youngblut, Ashley Shade, Jordan S. Read, Katherine D. McMahon, Rachel J. Whitaker	39–47
Environment-Dependent Distribution of the Sediment <i>nifH</i> -Harboring Microbiota in the Northern South China Sea	Hongyue Dang, Jinying Yang, Jing Li, Xiwu Luan, Yunbo Zhang, Guizhou Gu, Rongrong Xue, Mingyue Zong, Martin G. Klotz	121–132
Co-Occurring Anammox, Denitrification, and Codenitrification in Agricultural Soils	Andrew Long, Joshua Heitman, Craig Tobias, Rebecca Philips, Bongkeun Song	168–176
Relationship between Abundance and Specific Activity of Bacterioplankton in Open Ocean Surface Waters	Dana E. Hunt, Yajuan Lin, Matthew J. Church, David M. Karl, Susannah G. Tringe, Lisa K. Izzo, Zackary I. Johnson	177–184

- Polycyclovorans algicola* gen. nov., sp. nov., an Aromatic-Hydrocarbon-Degrading Marine Bacterium Found Associated with Laboratory Cultures of Marine Phytoplankton
- Structure and Ecological Roles of a Novel Exopolysaccharide from the Arctic Sea Ice Bacterium *Pseudoalteromonas* sp. Strain SM20310
- Form and Function of *Clostridium thermocellum* Biofilms
- Depth-Related Differences in Organic Substrate Utilization by Major Microbial Groups in Intertidal Marine Sediment
- MYCOLOGY**
- Isotope-Assisted Screening for Iron-Containing Metabolites Reveals a High Degree of Diversity among Known and Unknown Siderophores Produced by *Trichoderma* spp.
- PHYSIOLOGY**
- Functional  $\gamma$ -Aminobutyrate Shunt in *Listeria monocytogenes*: Role in Acid Tolerance and Succinate Biosynthesis
- Tetrathionate-Forming Thiosulfate Dehydrogenase from the Acidophilic, Chemolithoautotrophic Bacterium *Acidithiobacillus ferrooxidans*
- Invertase SUC2 Is the Key Hydrolase for Inulin Degradation in *Saccharomyces cerevisiae*
- PUBLIC HEALTH MICROBIOLOGY**
- Quantitative Microbial Risk Assessment of Pathogenic Vibrios in Marine Recreational Waters of Southern California
- Bartonella* Infections in Deer Keds (*Lipoptena cervi*) and Moose (*Alces alces*) in Norway
- Occurrence of Virulence Genes Associated with Diarrheagenic Pathotypes in *Escherichia coli* Isolates from Surface Water
- Improved Recovery of *Bacillus* Spores from Nonporous Surfaces with Cotton Swabs over Foam, Nylon, or Polyester, and the Role of Hydrophilicity of Cotton in Governing the Recovery Efficiency
- Colonization of *Campylobacter* spp. in Broiler Chickens and Laying Hens Reared in Tropical Climates with Low-Biosecurity Housing
- Tony Gutierrez, David H. Green, Peter D. Nichols, William B. Whitman, Kirk T. Semple, Michael D. Aitken 205–214
- Sheng-Bo Liu, Xiu-Lan Chen, Hai-Lun He, Xi-Ying Zhang, Bin-Bin Xie, Yong Yu, Bo Chen, Bai-Cheng Zhou, Yu-Zhong Zhang 224–230
- Alexandru Dumitrache, Gideon Wolfaardt, Grant Allen, Steven N. Liss, Lee R. Lynd 231–239
- Tetsuro Miyatake, Barbara J. MacGregor, Henricus T. S. Boschker 389–392
- Sylvia M. Lehner, Lea Atanasova, Nora K. N. Neumann, Rudolf Krska, Marc Lemmens, Irina S. Druzhinina, Rainer Schuhmacher 18–31
- Conor Feehily, Conor P. O’Byrne, Kimon Andreas G. Karatzas 74–80
- Mei Kikumoto, Shohei Nogami, Tadayoshi Kanao, Jun Takada, Kazuo Kamimura 113–120
- Shi-An Wang, Fu-Li Li 403–406
- Gregory Dickinson, Keah-ying Lim, Sunny C. Jiang 294–302
- Samuel Duodu, Knut Madslie, Eva Hjelm, Ylva Molin, Anna Paziewska-Harris, Philip D. Harris, Duncan J. Colquhoun, Bjørnar Ytrehus 322–327
- Jatinder P. S. Sidhu, Warish Ahmed, Leonie Hodgers, Simon Toze 328–335
- Pious Thomas, Mohammed M. Mujawar, Reshmi Upreti, Aparna C. Sekhar 381–384
- R. S. Kalupahana, K. S. A. Kottawatta, K. S. T. Kanankege, M. A. P. van Bergen, P. Abeynayake, J. A. Wagenaar 393–395

## TABLE OF CONTENTS

### SPOTLIGHT

Articles of Significant Interest Selected from This Issue by the Editors	415
--	-----

### MINIREVIEW

Taking the Starch out of Oral Biofilm Formation: Molecular Basis and Functional Significance of Salivary $\alpha$ -Amylase Binding to Oral Streptococci	Anna E. Nikitkova, Elaine M. Haase, Frank A. Scannapieco	416–423
---	--	---------

### BIODEGRADATION

Impact of Long-Term Diesel Contamination on Soil Microbial Community Structure	Nora B. Sutton, Farai Maphosa, Jose A. Morillo, Waleed Abu Al-Soud, Alette A. M. Langenhoff, Tim Grotenhuis, Huub H. M. Rijnaarts, Hauke Smidt	619–630
Comparative Genomic Analysis and Benzene, Toluene, Ethylbenzene, and <i>o</i> -, <i>m</i> -, and <i>p</i> -Xylene (BTEX) Degradation Pathways of <i>Pseudoxanthomonas spadix</i> BD-a59	Eun Jin Choi, Hyun Mi Jin, Seung Hyeon Lee, Renukaradhya K. Math, Eugene L. Madsen, Che Ok Jeon	663–671

### BIOTECHNOLOGY

Combinatorial Mutagenesis and Selection of Improved Signal Sequences and Their Application for High-Level Production of Translocated Heterologous Proteins in <i>Escherichia coli</i>	Tonje Marita Bjerkan Heggeset, Veronika Kucharova, Ingemar Nærdal, Svein Valla, Håvard Sletta, Trond Erling Ellingsen, Trygve Brautaset	559–568
Heterologous Carotenoid-Biosynthetic Enzymes: Functional Complementation and Effects on Carotenoid Profiles in <i>Escherichia coli</i>	Gyu Hyeon Song, Se Hyeuk Kim, Bo Hyun Choi, Se Jong Han, Pyung Cheon Lee	610–618

### ENVIRONMENTAL MICROBIOLOGY

Identification of <i>Methanoculleus</i> spp. as Active Methanogens during Anoxic Incubations of Swine Manure Storage Tank Samples	Maialen Barret, Nathalie Gagnon, Martin L. Kalmokoff, Edward Topp, Yris Verastegui, Stephen P. J. Brooks, Fernando Matias, Josh D. Neufeld, Guylaine Talbot	424–433
Spatiotemporal Analysis of <i>Cryptosporidium</i> Species/Genotypes and Relationships with Other Zoonotic Pathogens in Surface Water from Mixed-Use Watersheds	Graham Wilkes, Norma J. Ruecker, Norman F. Neumann, Victor P. J. Gannon, Cassandra Jokinen, Mark Sunohara, Edward Topp, Katarina D. M. Pintar, Thomas A. Edge, David R. Lapen	434–448
Molecular Characterization of Human-Pathogenic Microsporidia and <i>Cyclospora cayetanensis</i> Isolated from Various Water Sources in Spain: a Year-Long Longitudinal Study	Ana Luz Galván, Angela Magnet, Fernando Izquierdo, Soledad Fenoy, Cristina Rueda, Carmen Fernández Vadillo, Nuno Henriques-Gil, Carmen del Aguila	449–459
Diet-Induced Alterations of Host Cholesterol Metabolism Are Likely To Affect the Gut Microbiota Composition in Hamsters	Inés Martínez, Diahann J. Perdicaro, Andrew W. Brown, Susan Hammons, Trevor J. Carden, Timothy P. Carr, Kent M. Eskridge, Jens Walter	516–524
Surveying the Microbiome of Ants: Comparing 454 Pyrosequencing with Traditional Methods To Uncover Bacterial Diversity	Stefanie Kautz, Benjamin E. R. Rubin, Jacob A. Russell, Corrie S. Moreau	525–534

Enhanced Gene Detection Assays for Fumarate-Adding Enzymes Allow Uncovering of Anaerobic Hydrocarbon Degraders in Terrestrial and Marine Systems	Frederick von Netzer, Giovanni Pilloni, Sara Kleindienst, Martin Krüger, Katrin Knittel, Friederike Gründger, Tillmann Lueders	543–552
Comparative Analysis of <i>Leptospira</i> Strains Isolated from Environmental Soil and Water in the Philippines and Japan	Mitsumasa Saito, Sharon Y. A. M. Villanueva, Antara Chakraborty, Satoshi Miyahara, Takaya Segawa, Tatsuma Asoh, Ryo Ozuru, Nina G. Gloriani, Yasutake Yanagihara, Shin-ichi Yoshida	601–609
Distribution of <i>Clostridium botulinum</i> Type E Strains in Nunavik, Northern Quebec, Canada	Daniel Leclair, Jeffrey M. Farber, Bill Doidge, Burke Blanchfield, Sandy Suppa, Franco Pagotto, John W. Austin	646–654
Reconstruction of Novel Cyanobacterial Siphovirus Genomes from Mediterranean Metagenomic Fosmids	Carolina Megumi Mizuno, Francisco Rodriguez-Valera, Inmaculada Garcia-Heredia, Ana-Belen Martin-Cuadrado, Rohit Ghai	688–695
Environmental Transcription of <i>mmoX</i> by Methane-Oxidizing <i>Proteobacteria</i> in a Subarctic Palsa Peatland	Susanne Liebner, Mette M. Svenning	701–706
Chitin-Induced Gene Expression in Secondary Metabolic Pathways of <i>Streptomyces coelicolor</i> A3(2) Grown in Soil	Behnam Nazari, Michihiko Kobayashi, Akihiro Saito, Azam Hassaninasab, Kiyotaka Miyashita, Takeshi Fujii	707–713
Poly- $\gamma$ -D-Glutamic Acid Capsule Interferes with Lytic Infection of <i>Bacillus anthracis</i> by <i>B. anthracis</i> -Specific Bacteriophages	David Negus, Jane Burton, Angela Sweed, Romuald Gryko, Peter W. Taylor	714–717
Induction of Nitrate-Dependent Fe(II) Oxidation by Fe(II) in <i>Dechloromonas</i> sp. Strain UWNR4 and <i>Acidovorax</i> sp. Strain 2AN	Anirban Chakraborty, Flynn Picardal	748–752
<b>ENZYMOLGY AND PROTEIN ENGINEERING</b>		
Cello-Oligosaccharide Oxidation Reveals Differences between Two Lytic Polysaccharide Monooxygenases (Family GH61) from <i>Podospora anserina</i>	Mathieu Bey, Simeng Zhou, Laetitia Poidevin, Bernard Henrissat, Pedro M. Coutinho, Jean-Guy Berrin, Jean-Claude Sigoillot	488–496
Systems Engineering of Tyrosine 195, Tyrosine 260, and Glutamine 265 in Cyclodextrin Glycosyltransferase from <i>Paenibacillus macerans</i> To Enhance Maltodextrin Specificity for 2-O-D-Glucopyranosyl-L-Ascorbic Acid Synthesis	Ruizhi Han, Long Liu, Hyun-dong Shin, Rachel R. Chen, Jianghua Li, Guocheng Du, Jian Chen	672–677
<i>Clostridium carboxidivorans</i> Strain P7T Recombinant Formate Dehydrogenase Catalyzes Reduction of CO <sub>2</sub> to Formate	Apostolos Alissandratos, Hye-Kyung Kim, Hayden Matthews, James E. Hennessy, Amy Philbrook, Christopher J. Easton	741–744
<b>FOOD MICROBIOLOGY</b>		
Quantification of Yeast and Bacterial Gene Transcripts in Retail Cheeses by Reverse Transcription-Quantitative PCR	Christophe Monnet, Cécile Straub, Jessie Castellote, Djamila Onesime, Pascal Bonnarme, Françoise Irlinger	469–477
Landscape and Meteorological Factors Affecting Prevalence of Three Food-Borne Pathogens in Fruit and Vegetable Farms	Laura K. Strawn, Esther D. Fortes, Elizabeth A. Bihn, Kendra K. Nightingale, Yrjö T. Gröhn, Randy W. Worobo, Martin Wiedmann, Peter W. Bergholz	588–600
Intracellular Free Iron and Its Potential Role in Ultrahigh-Pressure-Induced Inactivation of <i>Escherichia coli</i>	Yuan Yan, Joy G. Waite-Cusic, Periannan Kuppusamy, Ahmed E. Yousef	722–724

## GENETICS AND MOLECULAR BIOLOGY

- Molecular Control of Sucrose Utilization in *Escherichia coli* W, an Efficient Sucrose-Utilizing Strain 478–487  
Suriana Sabri, Lars K. Nielsen, Claudia E. Vickers
- Gene Flow, Recombination, and Selection in Cyanobacteria: Population Structure of Geographically Related *Planktothrix* Freshwater Strains 508–515  
Hanne Sogge, Thomas Rohrlack, Trine B. Rounge, Jørn Henrik Sønstebo, Ave Tooming-Klunderud, Tom Kristensen, Kjetill S. Jakobsen
- Molecular Analysis of Human and Canine *Staphylococcus aureus* Strains Reveals Distinct Extended-Host-Spectrum Genotypes Independent of Their Methicillin Resistance 655–662  
S. Vincze, I. Stamm, S. Monecke, P. A. Kopp, T. Semmler, L. H. Wieler, A. Lübke-Becker, B. Walther
- Regulons of Three *Pseudomonas syringae* pv. tomato DC3000 Iron Starvation Sigma Factors 725–727  
Eric Markel, Bronwyn G. Butcher, Christopher R. Myers, Paul Stodghill, Sam Cartinhour, Bryan Swingle
- Identification of Gold Nanoparticle-Resistant Mutants of *Saccharomyces cerevisiae* Suggests a Role for Respiratory Metabolism in Mediating Toxicity 728–733  
Mark R. Smith, Matthew G. Boenzli, Vihangi Hindagolla, Jun Ding, John M. Miller, James E. Hutchison, Jeffrey A. Greenwood, Hagai Abeliovich, Alan T. Bakalinsky

## INVERTEBRATE MICROBIOLOGY

- Bacillus thuringiensis* Metalloproteinase Bmp1 Functions as a Nematicidal Virulence Factor 460–468  
Xiaoxia Luo, Ling Chen, Qiong Huang, Jinshui Zheng, Wei Zhou, Donghai Peng, Lifang Ruan, Ming Sun
- Characterization of a Newly Discovered Symbiont of the Whitefly *Bemisia tabaci* (Hemiptera: Aleyrodidae) 569–575  
Xiao-Li Bing, Jiao Yang, Einat Zchori-Fein, Xiao-Wei Wang, Shu-Sheng Liu

## METHODS

- A New, Sensitive Marine Microalgal Recombinant Biosensor Using Luminescence Monitoring for Toxicity Testing of Antifouling Biocides 631–638  
Sophie Sanchez-Ferandin, Fanny Leroy, François-Yves Bouget, Fabien Joux
- Use of Flow Cytometry for Rapid, Quantitative Detection of Poliovirus-Infected Cells via TAT Peptide-Delivered Molecular Beacons 696–700  
Divya Sivaraman, Hsiao-Yun Yeh, Ashok Mulchandani, Marylynn V. Yates, Wilfred Chen
- Construction of a Broad-Host-Range Tn7-Based Vector for Single-Copy P<sub>BAD</sub>-Controlled Gene Expression in Gram-Negative Bacteria 718–721  
F. Heath Damron, Elizabeth S. McKenney, Herbert P. Schweizer, Joanna B. Goldberg
- Multiplex PCR Assay Targeting a Diguanylate Cyclase-Encoding Gene, *cgcA*, To Differentiate Species within the Genus *Cronobacter* 734–737  
L. Carter, L. A. Lindsey, C. J. Grim, V. Sathyamoorthy, K. G. Jarvis, G. Gopinath, C. Lee, J. A. Sadowski, L. Trach, M. Pava-Ripoll, B. A. McCardell, B. D. Tall, L. Hu

## MICROBIAL ECOLOGY

- Predation Response of *Vibrio fischeri* Biofilms to Bacterivorous Protists 553–558  
Alba Chavez-Dozal, Clayton Gorman, Martina Erken, Peter D. Steinberg, Diane McDougald, Michele K. Nishiguchi
- Characterization of Newcastle Disease Viruses in Wild and Domestic Birds in Luxembourg from 2006 to 2008 639–645  
Chantal J. Snoeck, Marianna Marinelli, Emilie Charpentier, Aurélie Sausy, Tom Conzemius, Serge Losch, Claude P. Muller
- Influence of *Salmonella enterica* Serovar Enteritidis Infection on the Development of the Cecum Microbiota in Newly Hatched Chicks 745–747  
H. Juricova, P. Videnska, M. Lukac, M. Faldynova, V. Babak, H. Havlickova, F. Sisak, I. Rychlik

**PHYSIOLOGY**

**Osmoprotection of *Bacillus subtilis* through Import and Proteolysis of Proline-Containing Peptides**

Adrienne Zapras, Jeanette Brill, Marietta Thüning, Guido Wünsche, Magnus Heun, Helena Barzantny, Tamara Hoffmann, Erhard Bremer 576–587

**Physiological and Metabolic Effects of Carbon Monoxide Oxidation in the Model Marine Bacterioplankton *Ruegeria pomeroyi* DSS-3**

Michael Cunliffe 738–740

**PLANT MICROBIOLOGY**

**Contribution of Nitrate Assimilation to the Fitness of *Pseudomonas syringae* pv. *syringae* B728a on Plants**

Audrey Parangan-Smith, Steven Lindow 678–687

**PUBLIC HEALTH MICROBIOLOGY**

**Bifidobacterial Succession and Correlation Networks in a Large Unselected Cohort of Mothers and Their Children**

E. Avershina, O. Storrø, T. Øien, R. Johnsen, R. Wilson, T. Egeland, K. Rudi 497–507

**Persistence and Leaching Potential of Microorganisms and Mineral N in Animal Manure Applied to Intact Soil Columns**

M. G. Mostofa Amin, Anita Forslund, Xuan Thanh Bui, René K. Juhler, Søren O. Petersen, Mette Lægdsmand 535–542

**ERRATUM**

**Vol. 78, no. 23, 2012, Table of Contents**

753

## TABLE OF CONTENTS

### SPOTLIGHT

Articles of Significant Interest Selected from This Issue by the Editors

755

### BIOTECHNOLOGY

Improved Production of L-Threonine in *Escherichia coli* by Use of a DNA Scaffold System

Jun Hyoung Lee, Suk-Chae Jung, Le Minh Bui, Kui Hyeon Kang, Ji-Joon Song, Sun Chang Kim

774–782

Contribution of Bacillomycin D in *Bacillus amyloliquefaciens* SQR9 to Antifungal Activity and Biofilm Formation

Zhihui Xu, Jiahui Shao, Bing Li, Xin Yan, Qirong Shen, Ruifu Zhang

808–815

Recombinant *Bacillus subtilis* That Grows on Untreated Plant Biomass

Timothy D. Anderson, J. Izaak Miller, Henri-Pierre Fierobe, Robert T. Clubb

867–876

Metabolic Engineering of *Synechocystis* sp. Strain PCC 6803 for Isobutanol Production

Arul M. Varman, Yi Xiao, Himadri B. Pakrasi, Yinjie J. Tang

908–914

Combinatorial Design of a Highly Efficient Xylose-Utilizing Pathway in *Saccharomyces cerevisiae* for the Production of Cellulosic Biofuels

Byoungjin Kim, Jing Du, Dawn T. Eriksen, Huimin Zhao

931–941

Development of Novel Sugar Isomerases by Optimization of Active Sites in Phosphosugar Isomerases for Monosaccharides

Soo-Jin Yeom, Yeong-Su Kim, Deok-Kun Oh

982–988

A Combined System for Engineering Glycosylation Efficiency and Glycan Structure in *Saccharomyces cerevisiae*

Farnoush Parsaie Nasab, Markus Aebi, Gesche Bernhard, Alexander Daniel Frey

997–1007

Temperature- and Salinity-Decoupled Overproduction of Hydroxyectoine by *Chromohalobacter salexigens*

Javier Rodríguez-Moya, Montserrat Argandoña, Fernando Iglesias-Guerra, Joaquín J. Nieto, Carmen Vargas

1018–1023

### ENVIRONMENTAL MICROBIOLOGY

Carriage and Fecal Counts of Cefotaxime M-Producing *Escherichia coli* in Pigs: a Longitudinal Study

Katrine Hartung Hansen, Peter Damborg, Margit Andreasen, Søren Saxmose Nielsen, Luca Guardabassi

794–798

Inhibition of *Staphylococcus aureus* Invasion into Bovine Mammary Epithelial Cells by Contact with Live *Lactobacillus casei*

Damien S. Bouchard, Lucie Rault, Nadia Berkova, Yves Le Loir, Sergine Even

877–885

*Aeromonas* and *Pseudomonas* Species Carriers of *ampC* FOX Genes in Aquatic Environments

Veiko Voolaid, Tanel Tenson, Veljo Kisand

1055–1057

### ENZYMOLGY AND PROTEIN ENGINEERING

Functional Characterization of Reductive Dehalogenases by Using Blue Native Polyacrylamide Gel Electrophoresis

Shuiquan Tang, Winnie W. M. Chan, Kelly E. Fletcher, Jana Seifert, Xiaoming Liang, Frank E. Löffler, Elizabeth A. Edwards, Lorenz Adrian

974–981

### EVOLUTIONARY AND GENOMIC MICROBIOLOGY

The Mangotoxin Biosynthetic Operon (*mbo*) Is Specifically Distributed within *Pseudomonas syringae* Genomospecies 1 and Was Acquired Only Once during Evolution

Víctor J. Carrión, José A. Gutiérrez-Barranquero, Eva Arrebola, Leire Bardaji, Juan C. Codina, Antonio de Vicente, Francisco M. Cazorla, Jesús Murillo

756–767

**Adaptation and Heterogeneity of *Escherichia coli* MC1000 Growing in Complex Environments**

Pilar Eliana Puentes-Téllez, Martin Asser Hansen, Søren Johannes Sørensen, Jan Dirk van Elsas 1008–1017

**FOOD MICROBIOLOGY**

**FLX Pyrosequencing Analysis of the Effects of the Brown-Algal Fermentable Polysaccharides Alginate and Laminaran on Rat Cecal Microbiotas**

Choa An, Takashi Kuda, Takahiro Yazaki, Hajime Takahashi, Bon Kimura 860–866

**Biofilm as an Environment for Dissemination of *stx* Genes by Transduction**

H. T. Solheim, C. Sekse, A. M. Urdahl, Y. Wasteson, L. L. Nesse 896–900

**Examination of the Genome-Wide Transcriptional Response of *Escherichia coli* O157:H7 to Cinnamaldehyde Exposure**

Jeyachandran Visvalingam, Juan David Hernandez-Doria, Richard A. Holley 942–950

**GENETICS AND MOLECULAR BIOLOGY**

**Distinct Roles of Phenol-Soluble Modulins in Spreading of *Staphylococcus aureus* on Wet Surfaces**

Eleni Tsompanidou, Emma L. Denham, Dörte Becher, Anne de Jong, Girbe Buist, Marleen van Oosten, Willem L. Manson, Jaap Willem Back, Jan Maarten van Dijl, Annette Dreisbach 886–895

**HbzF Catalyzes Direct Hydrolysis of Maleylpyruvate in the Gentisate Pathway of *Pseudomonas alcaligenes* NCIMB 9867**

Kun Liu, Ting-Ting Liu, Ning-Yi Zhou 1044–1047

**GEOMICROBIOLOGY**

**Outer Cell Surface Components Essential for Fe(III) Oxide Reduction by *Geobacter metallireducens***

Jessica A. Smith, Derek R. Lovley, Pier-Luc Tremblay 901–907

**Anaerobic Coculture of Microalgae with *Thermosiphon globiformans* and *Methanocaldococcus jannaschii* at 68°C Enhances Generation of *n*-Alkane-Rich Biofuels after Pyrolysis**

Kunio Yamane, Shigeru Matsuyama, Kensuke Igarashi, Motoo Utsumi, Yoshihiro Shiraiwa, Tomohiko Kuwabara 924–930

**Gene Identification and Substrate Regulation Provide Insights into Sulfur Accumulation during Bioleaching with the Psychrotolerant Acidophile *Acidithiobacillus ferrivorans***

Maria Liljeqvist, Olena I. Rzhepishevskaya, Mark Dopson 951–957

**INVERTEBRATE MICROBIOLOGY**

**Characterization and Molecular Epidemiology of a Fungal Infection of Edible Crabs (*Cancer pagurus*) and Interaction of the Fungus with the Dinoflagellate Parasite *Hematodinium***

Amanda L. Smith, Kristina M. Hamilton, Lucy Hirschle, Emma C. Wootton, Claire L. Vogan, Edward C. Pope, Daniel C. Eastwood, Andrew F. Rowley 783–793

**METHODS**

**Mycobacteriophage Ms6 LysA: a Peptidoglycan Amidase and a Useful Analytical Tool**

Sebabrata Mahapatra, Charles Piechota, Filipa Gil, Yufang Ma, Hairong Huang, Michael S. Scherman, Victoria Jones, Martin S. Pavelka, Jr., Jose Moniz-Pereira, Madalena Pimentel, Michael R. McNeil, Dean C. Crick 768–773

**Profiling *In Situ* Microbial Community Structure with an Amplification Microarray**

Darrell P. Chandler, Christopher Knickerbocker, Lexi Bryant, Julia Golova, Cory Wiles, Kenneth H. Williams, Aaron D. Peacock, Philip E. Long 799–807

**Identification of *Borrelia burgdorferi ospC* Genotypes in Host Tissue and Feeding Ticks by Terminal Restriction Fragment Length Polymorphisms**

Kimberly Tsao, Stephen J. Bent, Durland Fish 958–964

**Autofluorescence as a Tool for Structural Analysis of Biofilms Formed by Nonpigmented Rapidly Growing Mycobacteria**

María-Carmen Muñoz-Egea, María García-Pedrazuela, Ignacio Mahillo, María Jesús García, Jaime Esteban 1065–1067

**MICROBIAL ECOLOGY**

**Detection of Putatively Thermophilic Anaerobic Methanotrophs in Diffuse Hydrothermal Vent Fluids**

Alexander Y. Merkel, Julie A. Huber, Nikolay A. Chernykh, Elizaveta A. Bonch-Osmolovskaya, Alexander V. Lebedinsky 915–923

**Recruitment and Rearrangement of Three Different Genetic Determinants into a Conjugative Plasmid Increase Copper Resistance in *Pseudomonas syringae***

José A. Gutiérrez-Barranquero, Antonio de Vicente, Víctor J. Carrión, George W. Sundin, Francisco M. Cazorla 1028–1033

**Bacterial and Archaeal Diversity in Sediments of West Lake Bonney, McMurdo Dry Valleys, Antarctica**

Chao Tang, Michael T. Madigan, Brian Lanoil 1034–1038

**MYCOLOGY**

**Processivity and Enzymatic Mode of a Glycoside Hydrolase Family 5 Endoglucanase from *Volvariella volvacea***

Fei Zheng, Shaojun Ding 989–996

**PLANT MICROBIOLOGY**

**Diverse Microhabitats Experienced by *Halomonas variabilis* on Salt-Secreting Leaves**

Adrien Y. Burch, Omri M. Finkel, Juliana K. Cho, Shimshon Belkin, Steven E. Lindow 845–852

**The Type III Secretion System of *Bradyrhizobium japonicum* USDA122 Mediates Symbiotic Incompatibility with Rj2 Soybean Plants**

Takahiro Tsukui, Shima Eda, Takakazu Kaneko, Shusei Sato, Shin Okazaki, Kaori Kakizaki-Chiba, Manabu Itakura, Hisayuki Mitsui, Akifumi Yamashita, Kimihiro Terasawa, Kiwamu Minamisawa 1048–1051

**PUBLIC HEALTH MICROBIOLOGY**

**Molecular Diversity of *Bacteroidales* in Fecal and Environmental Samples and Swine-Associated Subpopulations**

Regina Lamendella, Kent C. Li, Daniel Oerther, Jorge W. Santo Domingo 816–824

**Nontuberculous Mycobacteria, Fungi, and Opportunistic Pathogens in Unchlorinated Drinking Water in the Netherlands**

Paul W. J. J. van der Wielen, Dick van der Kooij 825–834

**Biological and Physicochemical Wastewater Treatment Processes Reduce the Prevalence of Virulent *Escherichia coli***

Dominic Frigon, Basanta Kumar Biswal, Alberto Mazza, Luke Masson, Ronald Gehr 835–844

**Dynamics and Diversity of *Escherichia coli* in Animals and System Management of the Manure on a Commercial Farrow-to-Finish Pig Farm**

Mauricio Marchant, Miguel A. Moreno 853–859

**Evidence for Phenotypic Plasticity among Multihost *Campylobacter jejuni* and *C. coli* Lineages, Obtained Using Ribosomal Multilocus Sequence Typing and Raman Spectroscopy**

Daniel S. Read, Dan J. Woodcock, Norval J. C. Strachan, Kenneth J. Forbes, Frances M. Colles, Martin C. J. Maiden, Felicity Clifton-Hadley, Anne Ridley, Ana Vidal, John Rodgers, Andrew S. Whiteley, Samuel K. Sheppard 965–973

**Wide Distribution and Genetic Diversity of “*Candidatus Neoehrlichia mikurensis*” in Rodents from China**

Hao Li, Jiafu Jiang, Fang Tang, Yi Sun, Zengde Li, Weilong Zhang, Zhengda Gong, Kun Liu, Hong Yang, Wei Liu, Wuchun Cao 1024–1027

**Link between Geographical Origin and Occurrence of *Brucella abortus* Biovars in Cow and Water Buffalo Herds**

Giorgia Borriello, Simone Peletto, Maria G. Lucibelli, Pier L. Acutis, Danilo Ercolini, Giorgio Galiero 1039–1043

***Escherichia coli* and *Klebsiella pneumoniae* Producing CTX-M Cephalosporinase from Swine Finishing Barns and Their Association with Antimicrobial Use**

Dixie F. Mollenkopf, Jennifer M. Mirecki, Joshua B. Daniels, Julie A. Funk, Steven C. Henry, Glenn E. Hansen, Peter R. Davies, Tara S. Donovan, Thomas E. Wittum 1052–1054

**Enterohemorrhagic *Escherichia coli* O157:H7 Survival in an *In Vitro* Model of the Human Large Intestine and Interactions with Probiotic Yeasts and Resident Microbiota**

Jonathan Thévenot, Lucie Etienne-Mesmin, Sylvain Denis, Sandrine Chalancon, Monique Alric, Valérie Livrelli, Stéphanie Blanquet-Diot 1058–1064

## TABLE OF CONTENTS

### SPOTLIGHT

Articles of Significant Interest Selected from This Issue by the Editors	1069
--	------

### BIODEGRADATION

Isolation of <i>Acetobacterium</i> sp. Strain AG, Which Reductively Debrominates Octa- and Pentabrominated Diphenyl Ether Technical Mixtures	Chang Ding, Wai Ling Chow, Jianzhong He	1110–1117
Microbial Gutta-Percha Degradation Shares Common Steps with Rubber Degradation by <i>Nocardia nova</i> SH22a	Quan Luo, Sebastian Hiessl, Anja Poehlein, Alexander Steinbüchel	1140–1149
Kinetics of 1,2-Dichloroethane and 1,2-Dibromoethane Biodegradation in Anaerobic Enrichment Cultures	Rong Yu, Hari S. Peethambaram, Ronald W. Falta, Matthew F. Verce, James K. Henderson, Christopher E. Bagwell, Robin L. Brigmon, David L. Freedman	1359–1367

### BIOTECHNOLOGY

A Genetic System for <i>Clostridium ljungdahlii</i> : a Chassis for Autotrophic Production of Biocommodities and a Model Homoacetogen	Ching Leang, Toshiyuki Ueki, Kelly P. Nevin, Derek R. Lovley	1102–1109
Efficient Bioconversion of Echinocandin B to Its Nucleus by Overexpression of Deacylase Genes in Different Host Strains	Lei Shao, Jian Li, Aijuan Liu, Qing Chang, Huimin Lin, Daijie Chen	1126–1133
Engineering of <i>Corynebacterium glutamicum</i> for High-Yield L-Valine Production under Oxygen Deprivation Conditions	Satoshi Hasegawa, Masako Suda, Kimio Uematsu, Yumi Natsuma, Kazumi Hiraga, Toru Jojima, Masayuki Inui, Hideaki Yukawa	1250–1257
Soft-X-Ray-Enhanced Electrostatic Precipitation for Protection against Inhalable Allergens, Ultrafine Particles, and Microbial Infections	Eric M. Kettleson, Jill M. Schriewer, R. Mark L. Buller, Pratim Biswas	1333–1341
<i>Lucilia sericata</i> Chymotrypsin Disrupts Protein Adhesin-Mediated Staphylococcal Biofilm Formation	Llinos G. Harris, Yamni Nigam, James Sawyer, Dietrich Mack, David I. Pritchard	1393–1395

### ENVIRONMENTAL MICROBIOLOGY

Genomic Plasticity Enables a Secondary Electron Transport Pathway in <i>Shewanella oneidensis</i>	M. Schicklberger, G. Sturm, J. Gescher	1150–1159
Why Orange Guaymas Basin <i>Beggiatoa</i> spp. Are Orange: Single-Filament-Genome-Enabled Identification of an Abundant Octaheme Cytochrome with Hydroxylamine Oxidase, Hydrazine Oxidase, and Nitrite Reductase Activities	Barbara J. MacGregor, Jennifer F. Biddle, Jason R. Siebert, Eric Staunton, Eric L. Hegg, Ann G. Matthyse, Andreas Teske	1183–1190
Comparative Quantitative Analysis of Gene Expression Profiles of Glycoside Hydrolase Family 10 Xylanases in the Sheep Rumen during a Feeding Cycle	Zhongyuan Li, Heng Zhao, Peilong Yang, Junqi Zhao, Huoqing Huang, Xianli Xue, Xinshang Zhang, Qiyu Diao, Bin Yao	1212–1220
Distribution and Environmental Persistence of the Causative Agent of White-Nose Syndrome, <i>Geomyces destructans</i> , in Bat Hibernacula of the Eastern United States	Jeffrey M. Lorch, Laura K. Muller, Robin E. Russell, Michael O'Connor, Daniel L. Lindner, David S. Blehert	1293–1301

- Mechanisms of Human Adenovirus Inactivation by Sunlight and UVC Light as Examined by Quantitative PCR and Quantitative Proteomics**
- Franziska Bosshard, Florence Armand, Romain Hamelin, Tamar Kohn 1325–1332
- Extensive Reduction of Cell Viability and Enhanced Matrix Production in *Pseudomonas aeruginosa* PAO1 Flow Biofilms Treated with a D-Amino Acid Mixture**
- Zoe Sanchez, Akio Tani, Kazuhide Kimbara 1396–1399
- Patterned Hydrophobic Domains in the Exopolymer Matrix of *Shewanella oneidensis* MR-1 Biofilms**
- Fadi Aldeek, Raphaël Schneider, Marie-Pierre Fontaine-Aupart, Christian Mustin, Sandrine Lécart, Christophe Merlin, Jean-Claude Block 1400–1402
- The Rare *ospC* Allele L of *Borrelia burgdorferi* Sensu Stricto, Commonly Found among Samples Collected in a Coastal Plain Area of the Southeastern United States, Is Associated with *Ixodes affinis* Ticks and Local Rodent Hosts *Peromyscus gossypinus* and *Sigmodon hispidus***
- Natalia Rudenko, Maryna Golovchenko, Libor Grubhoffer, James H. Oliver, Jr. 1403–1406
- ENZYMOLGY AND PROTEIN ENGINEERING**
- Heterologous Expression of a Bioactive  $\beta$ -Hexosyltransferase, an Enzyme Producer of Prebiotics, from *Sporobolomyces singularis***
- Suzanne F. Dagher, M. Andrea Azcarate-Peril, José M. Bruno-Bárcena 1241–1249
- Gene Cloning and Characterization of Two NADH-Dependent 3-Quinuclidinone Reductases from *Microbacterium luteolum* JCM 9174**
- Kentaro Isotani, Junji Kurokawa, Furniko Suzuki, Syunsuke Nomoto, Takashi Negishi, Michiko Matsuda, Nobuya Itoh 1378–1384
- EVOLUTIONARY AND GENOMIC MICROBIOLOGY**
- Proteome Analyses of Strains ATCC 51142 and PCC 7822 of the Diazotrophic Cyanobacterium *Cyanothece* sp. under Culture Conditions Resulting in Enhanced H<sub>2</sub> Production**
- Uma K. Aryal, Stephen J. Callister, Sujata Mishra, Xiaohui Zhang, Janani I. Shutthanandan, Thomas E. Angel, Anil K. Shukla, Matthew E. Monroe, Ronald J. Moore, David W. Koppelaar, Richard D. Smith, Louis Sherman 1070–1077
- Reconciliation of Sequence Data and Updated Annotation of the Genome of *Agrobacterium tumefaciens* C58, and Distribution of a Linear Chromosome in the Genus *Agrobacterium***
- Steven Slater, João C. Setubal, Brad Goodner, Kathryn Houmiel, Jian Sun, Rajinder Kaul, Barry S. Goldman, Stephen K. Farrand, Nalvo Almeida, Jr., Thomas Burr, Eugene Nester, David M. Rhoads, Ryosuke Kadoi, Trucian Ostheimer, Nicole Pride, Allison Sabo, Erin Henry, Erin Telepak, Lindsey Cromes, Alana Harkleroad, Louis Oliphant, Phil Pratt-Szegila, Roy Welch, Derek Wood 1414–1417
- FOOD MICROBIOLOGY**
- Significance of Heme-Based Respiration in Meat Spoilage Caused by *Leuconostoc gasicomitatum***
- Elina Jääskeläinen, Per Johansson, Olli Kostianen, Timo Nieminen, Georg Schmidt, Panu Somervuo, Marzia Mohsina, Paula Vanninen, Petri Auvinen, Johanna Björkroth 1078–1085
- Uptake of  $\alpha$ -Ketoglutarate by Citrate Transporter CitP Drives Transamination in *Lactococcus lactis***
- Agata M. Pudlik, Juke S. Lolkema 1095–1101
- New Insights into Sulfur Metabolism in Yeasts as Revealed by Studies of *Yarrowia lipolytica***
- Agnès Hébert, Marie-Pierre Forquin-Gomez, Aurélie Roux, Julie Aubert, Christophe Junot, Jean-François Heilier, Sophie Landaud, Pascal Bonnarme, Jean-Marie Beckerich 1200–1211

- S-Layer Protein Mediates the Stimulatory Effect of *Lactobacillus helveticus* MIMLh5 on Innate Immunity** Valentina Taverniti, Milda Stuknyte, Mario Minuzzo, Stefania Arioli, Ivano De Noni, Christian Scabiosi, Zuzet Martinez Cordova, Ilkka Junttila, Sanna Hämäläinen, Hannu Turpeinen, Diego Mora, Matti Karp, Marko Pesu, Simone Guglielmetti 1221–1231
- Reducing Biogenic-Amine-Producing Bacteria, Decarboxylase Activity, and Biogenic Amines in Raw Milk Cheese by High-Pressure Treatments** Javier Calzada, Ana del Olmo, Antonia Picón, Pilar Gaya, Manuel Nuñez 1277–1283
- Catabolism of Serine by *Pediococcus acidilactici* and *Pediococcus pentosaceus*** Stefan Irmeler, Tharmatha Bavan, Andrea Oberli, Alexandra Roetschi, René Badertscher, Barbara Guggenbühl, Héléne Berthoud 1309–1315
- Survival of *Mycobacterium avium* subsp. *paratuberculosis* in Synthetic Human Gastric Juice and Acidified Porcine Bile** J. P. Dalton, C. Hill 1418–1420
- GEOMICROBIOLOGY**
- Intercontinental Dispersal of Bacteria and Archaea by Transpacific Winds** David J. Smith, Hilka J. Timonen, Daniel A. Jaffe, Dale W. Griffin, Michele N. Birmele, Kevin D. Perry, Peter D. Ward, Michael S. Roberts 1134–1139
- Surface Orientation Affects the Direction of Cone Growth by *Leptolyngbya* sp. Strain C1, a Likely Architect of Coniform Structures Octopus Spring (Yellowstone National Park)** Kristina Reyes, Nicolas I. Gonzalez III, Joshua Stewart, Frank Ospino, Dickie Nguyen, David T. Cho, Nahal Ghahremani, John R. Spear, Hope A. Johnson 1302–1308
- INVERTEBRATE MICROBIOLOGY**
- Analogous Population Structures for Two Alphabaculoviruses Highlight a Functional Role for Deletion Mutants** Amaya Serrano, Trevor Williams, Oihane Simón, Miguel López-Ferber, Primitivo Caballero, Delia Muñoz 1118–1125
- “*Candidatus* Hepatobacter penaei,” an Intracellular Pathogenic Enteric Bacterium in the Hepatopancreas of the Marine Shrimp *Penaeus vannamei* (Crustacea: Decapoda)** Linda M. Nunan, Carlos R. Pantoja, Silvia Gomez-Jimenez, Donald V. Lightner 1407–1409
- METHODS**
- Bioluminescence Imaging Study of Spatial and Temporal Persistence of *Lactobacillus plantarum* and *Lactococcus lactis* in Living Mice** Catherine Daniel, Sabine Poirer, Véronique Dennin, Denise Boutillier, Bruno Pot 1086–1094
- Quantification of IncP-1 Plasmid Prevalence in Environmental Samples** Sven Jechalke, Simone Dealtry, Kornelia Smalla, Holger Heuer 1410–1413
- MICROBIAL ECOLOGY**
- Normal Operating Range of Bacterial Communities in Soil Used for Potato Cropping** Özgül İnceoğlu, Leo Simon van Overbeek, Joana Falcão Salles, Jan Dirk van Elsas 1160–1170
- Evidence for Niche Partitioning Revealed by the Distribution of Sulfur Oxidation Genes Collected from Areas of a Terrestrial Sulfidic Spring with Differing Geochemical Conditions** Brendan Headd, Annette Summers Engel 1171–1182
- Microbial Mechanisms Mediating Increased Soil C Storage under Elevated Atmospheric N Deposition** Sarah D. Eisenlord, Zachary Freedman, Donald R. Zak, Kai Xue, Zhili He, Jizhong Zhou 1191–1199
- Transmission Dynamics of *Bartonella* sp. Strain OE 1-1 in Sundevall’s Jirds (*Meriones crassus*)** Danny Morick, Boris R. Krasnov, Irina S. Khokhlova, Yuval Gottlieb, Shimon Harrus 1258–1264

**Protective Mechanisms of Respiratory Tract Streptococci against *Streptococcus pyogenes* Biofilm Formation and Epithelial Cell Infection**

Tomas Fiedler, Catur Riani, Dirk Koczan, Kerstin Standar, Bernd Kreikemeyer, Andreas Podbielski 1265–1276

**Functional Gene Differences in Soil Microbial Communities from Conventional, Low-Input, and Organic Farmlands**

Kai Xue, Liyou Wu, Ye Deng, Zhili He, Joy Van Nostrand, Philip G. Robertson, Thomas M. Schmidt, Jizhong Zhou 1284–1292

**Ecological Divergence of a Novel Group of *Chloroflexus* Strains along a Geothermal Gradient**

Michael L. Weltzer, Scott R. Miller 1353–1358

**Soil Microbe Active Community Composition and Capability of Responding to Litter Addition after 12 Years of No Inputs**

Stephanie Yarwood, Elizabeth Brewer, Rockie Yarwood, Kate Lajtha, David Myrold 1385–1392

## MYCOLOGY

**Efficient Plant Biomass Degradation by Thermophilic Fungus *Myceliophthora heterothallica***

Joost van den Brink, Gonny C. J. van Muiswinkel, Bart Theelen, Sandra W. A. Hinz, Ronald P. de Vries 1316–1324

## PUBLIC HEALTH MICROBIOLOGY

**Specific Properties of Enteropathogenic *Escherichia coli* Isolates from Diarrheal Patients and Comparison to Strains from Foods and Fecal Specimens from Cattle, Swine, and Healthy Carriers in Osaka City, Japan**

Lili Wang, Mitsuko Wakushima, Tetsu Aota, Yuka Yoshida, Toshimasa Kita, Tomofumi Maehara, Jun Ogasawara, Changsun Choi, Yoichi Kamata, Yukiko Hara-Kudo, Yoshikazu Nishikawa 1232–1240

**Comparison of Filters for Concentrating Microbial Indicators and Pathogens in Lake Water Samples**

Donna S. Francy, Erin A. Stelzer, Amie M. G. Brady, Carrie Huitger, Rebecca N. Bushon, Hon S. Ip, Michael W. Ware, Eric N. Villegas, Vicente Gallardo, H. D. Alan Lindquist 1342–1352

**Sanitizer Efficacy against Murine Norovirus, a Surrogate for Human Norovirus, on Stainless Steel Surfaces when Using Three Application Methods**

Stephanie L. Bolton, Grishma Kotwal, Mark A. Harrison, S. Edward Law, Judy A. Harrison, Jennifer L. Cannon 1368–1377

## TABLE OF CONTENTS

### SPOTLIGHT

Articles of Significant Interest Selected from This Issue by the Editors	1421
--	------

### BIODEGRADATION

Bacterial Cytochrome P450 System Catabolizing the <i>Fusarium</i> Toxin Deoxynivalenol	Michihiro Ito, Ikuo Sato, Masumi Ishizaka, Shin-ichiro Yoshida, Motoo Koitabashi, Shigenobu Yoshida, Seiya Tsushima	1619–1628
Role of Nitrogen Limitation in Transformation of RDX (Hexahydro-1,3,5-Trinitro-1,3,5-Triazine) by <i>Gordonia</i> sp. Strain KTR9	Karl J. Indest, Dawn E. Hancock, Carina M. Jung, Jed O. Eberly, William W. Mohn, Lindsay D. Eltis, Fiona H. Crocker	1746–1750

### BIOTECHNOLOGY

Use of a Novel <i>Escherichia coli</i> - <i>Leuconostoc</i> Shuttle Vector for Metabolic Engineering of <i>Leuconostoc citreum</i> To Overproduce D-Lactate	Han Seung Chae, Seung Hwan Lee, Ju-Hoon Lee, Si Jae Park, Pyung Cheon Lee	1428–1435
Single Amino Acid Substitutions in HXT2.4 from <i>Scheffersomyces stipitis</i> Lead to Improved Cellobiose Fermentation by Engineered <i>Saccharomyces cerevisiae</i>	Suk-Jin Ha, Heejin Kim, Yuping Lin, Myoung-Uoon Jang, Jonathan M. Galazka, Tae-Jip Kim, Jamie H. D. Cate, Yong-Su Jin	1500–1507
Continuous Cellulosic Bioethanol Fermentation by Cyclic Fed-Batch Cocultivation	He-Long Jiang, Qiang He, Zhili He, Christopher L. Hemme, Liyou Wu, Jizhong Zhou	1580–1589
Engineering <i>Synechococcus elongatus</i> PCC 7942 for Continuous Growth under Diurnal Conditions	Jordan T. McEwen, Iara M. P. Machado, Michael R. Connor, Shota Atsumi	1668–1675

### ENVIRONMENTAL MICROBIOLOGY

Molecular Fingerprinting of Cyanobacteria from River Biofilms as a Water Quality Monitoring Tool	Virginia Loza, Elvira Perona, Pilar Mateo	1459–1472
Patterns of Nucleotide Diversity of the <i>ldpA</i> Circadian Gene in Closely Related Species of Cyanobacteria from Extreme Cold Deserts	Ka Wai Ng, Stephen B. Pointing, Volodymyr Dvornyk	1516–1522
Molecular Characterization of “ <i>Candidatus Parilichlamydia carangidicola</i> ,” a Novel <i>Chlamydia</i> -Like Epitheliocystis Agent in Yellowtail Kingfish, <i>Seriola lalandi</i> (Valenciennes), and the Proposal of a New Family, “ <i>Candidatus Parilichlamydiaceae</i> ” fam. nov. (Order <i>Chlamydiales</i> )	M. C. Stride, A. Polkinghorne, T. L. Miller, J. M. Groff, S. E. LaPatra, B. F. Nowak	1590–1597
<i>Mycobacterium gilvum</i> Illustrates Size-Correlated Relationships between Mycobacteria and <i>Acanthamoeba polyphaga</i>	Otmane Lamrabet, Michel Drancourt	1606–1611
Molecular Analysis of the <i>In Situ</i> Growth Rates of Subsurface <i>Geobacter</i> Species	Dawn E. Holmes, Ludovic Giloteaux, Melissa Barlett, Milind A. Chavan, Jessica A. Smith, Kenneth H. Williams, Michael Wilkins, Philip Long, Derek R. Lovley	1646–1653
Tracking the Primary Sources of Fecal Pollution in a Tropical Watershed in a One-Year Study	Carlos Toledo-Hernandez, Hodon Ryu, Joel Gonzalez-Nieves, Evelyn Huertas, Gary A. Toranzos, Jorge W. Santo Domingo	1689–1696

**Increased Abundance and Transferability of Resistance Genes after Field Application of Manure from Sulfadiazine-Treated Pigs**

Sven Jechalke, Christoph Kopmann, 1704–1711  
Ingrid Rosendahl, Joost Groeneweg,  
Viola Weichelt, Ellen  
Krögerrecklenfort, Nikola Brandes,  
Mathias Nordwig, Guo-Chun Ding, Jan  
Siemens, Holger Heuer, Kornelia  
Smalla

***Anaplasma phagocytophilum* in Questing *Ixodes ricinus* Ticks: Comparison of Prevalences and Partial 16S rRNA Gene Variants in Urban, Pasture, and Natural Habitats**

Evelyn Overzier, Kurt Pfister, Claudia 1730–1734  
Thiel, Ingrid Herb, Monia Mahling,  
Cornelia Silaghi

**Evidence for Broad-Spectrum Biofilm Inhibition by the Bacterium *Bacillus* sp. Strain SW9**

Zhuoying Wu, Chengsong Ye, Feng 1735–1738  
Guo, Shenghua Zhang, Xin Yu

**ENZYMOLGY AND PROTEIN ENGINEERING**

**Reconstitution of a Thermostable Xylan-Degrading Enzyme Mixture from the Bacterium *Caldicellulosiruptor bescii***

Xiaoyun Su, Yejun Han, Dylan Dodd, 1481–1490  
Young Hwan Moon, Shosuke Yoshida,  
Roderick I. Mackie, Isaac K. O. Cann

**Engineering the Substrate Specificity of a Thermophilic Penicillin Acylase from *Thermus thermophilus***

Leticia L. Torres, Ángel Cantero, 1555–1562  
Mercedes del Valle, Anabel Marina,  
Fernando López-Gallego, José M.  
Guisán, José Berenguer, Aurelio  
Hidalgo

**Heterologous Overexpression and Characterization of a Flavoprotein-Cytochrome *c* Complex Fructose Dehydrogenase of *Gluconobacter japonicus* NBRC3260**

Shota Kawai, Maiko Goda-Tsutsumi, 1654–1660  
Toshiharu Yakushi, Kenji Kano,  
Kazunobu Matsushita

**EVOLUTIONARY AND GENOMIC MICROBIOLOGY**

**Phylogenetic Distribution of Potential Cellulases in Bacteria**

Renaud Berlemont, Adam C. Martiny 1545–1554

**Evolution of the Stx2-Encoding Prophage in Persistent Bovine *Escherichia coli* O157:H7 Strains**

Dongjin Park, Eliot Stanton, Kristin 1563–1572  
Ciezeki, Daniel Parrell, Matthew Bozile,  
Daniel Pike, Steven A. Forst, Kwang  
Cheol Jeong, Renata Ivanek, Dörte  
Döpfer, Charles W. Kaspar

**Comparison of the Genome Sequences of “*Candidatus Portiera aleyrodidarum*” Primary Endosymbionts of the Whitefly *Bemisia tabaci* B and Q Biotypes**

Zi-Feng Jiang, Fangfang Xia, Kipp W. 1757–1759  
Johnson, Christopher D. Brown,  
Elizabeth Bartom, Jigyasa H. Tuteja,  
Rick Stevens, Robert L. Grossman,  
Marina Brumin, Kevin P. White,  
Murad Ghanim

**FOOD MICROBIOLOGY**

**Rapid and Sensitive Method To Identify *Mycobacterium avium* subsp. *paratuberculosis* in Cow’s Milk by DNA Methylase Genotyping**

Silvia Leonor Mundo, Liliana Rosa 1612–1618  
Gilardoni, Federico José Hoffman,  
Osvaldo Jorge Lopez

**GENETICS AND MOLECULAR BIOLOGY**

***dpr* and *sod* in *Streptococcus mutans* Are Involved in Coexistence with *S. sanguinis*, and PerR Is Associated with Resistance to H<sub>2</sub>O<sub>2</sub>**

Kei Fujishima, Miki Kawada-Matsuo, 1436–1443  
Yuichi Oogai, Masayuki Tokuda,  
Mitsuo Torii, Hitoshi Komatsuzawa

**Detection of *Borrelia burgdorferi* Sensu Stricto *ospC* Alleles Associated with Human Lyme Borreliosis Worldwide in Non-Human-Biting Tick *Ixodes affinis* and Rodent Hosts in Southeastern United States**

Nataliia Rudenko, Maryna 1444–1453  
Golovchenko, Václav Hönig, Nadja  
Mallátová, Lenka Krbková, Peter  
Mikulášek, Natalia Fedorova, Natalia  
M. Belfiore, Libor Grubhoffer, Robert  
S. Lane, James H. Oliver, Jr.

Gene Expression Analysis of Copper Tolerance and Wood Decay in the Brown Rot Fungus <i>Fibroporia radiculosa</i>	Juliet D. Tang, Leslie A. Parker, Andy D. Perkins, Tad S. Sonstegard, Steven G. Schroeder, Darrel D. Nicholas, Susan V. Diehl	1523–1533
<i>Phytophthora infestans</i> Cholinephosphotransferase with Substrate Specificity for Very-Long-Chain Polyunsaturated Fatty Acids	Yan Chen, Hsiang-yun Chi, Dauopen Meesapyodsuk, Xiao Qiu	1573–1579
<b>INVERTEBRATE MICROBIOLOGY</b>		
Polyketide Synthase Gene Diversity within the Microbiome of the Sponge <i>Arenosclera brasiliensis</i> , Endemic to the Southern Atlantic Ocean	Amaro E. Trindade-Silva, Cintia P. J. Rua, Bruno G. N. Andrade, Ana Carolina Paulo Vicente, Genivaldo G. Z. Silva, Roberto G. S. Berlinck, Fabiano L. Thompson	1598–1605
<b>METHODS</b>		
Novel Platform for the Detection of <i>Staphylococcus aureus</i> Enterotoxin B in Foods	Sandra M. Tallent, Jeffrey A. DeGrasse, Ningyan Wang, Daiva M. Mattis, David M. Kranz	1422–1427
Depletion of Unwanted Nucleic Acid Templates by Selective Cleavage: LNAzymes, Catalytically Active Oligonucleotides Containing Locked Nucleic Acids, Open a New Window for Detecting Rare Microbial Community Members	Jan Dolinšek, Christiane Dorninger, Ilias Lagkouvardos, Michael Wagner, Holger Daims	1534–1544
MiniUIB, a Novel Minitransposon-Based System for Stable Insertion of Foreign DNA into the Genomes of Gram-Negative and Gram-Positive Bacteria	Joseph Alexander Christie-Oleza, Isabel Brunet-Galmés, Jorge Lalucat, Balbina Nogales, Rafael Bosch	1629–1638
Development of a New Generation of Vectors for Gene Expression, Gene Replacement, and Protein-Protein Interaction Studies in Mycobacteria	Amit Parikh, Devanand Kumar, Yogesh Chawla, Krishna Kurthkoti, Shazia Khan, Umesh Varshney, Vinay K. Nandicoori	1718–1729
Upgrading Fungal Gene Expression on Demand: Improved Systems for Doxycycline-Dependent Silencing in <i>Aspergillus fumigatus</i>	Christoph Helmschrott, Anna Sasse, Sweta Samantaray, Sven Krappmann, Johannes Wagener	1751–1754
<b>MICROBIAL ECOLOGY</b>		
Integration of <i>Vibrio vulnificus</i> into Marine Aggregates and Its Subsequent Uptake by <i>Crassostrea virginica</i> Oysters	Brett Froelich, Mesrop Ayrapetyan, James D. Oliver	1454–1458
Genotypic and Phenotypic Characterization of <i>Staphylococcus aureus</i> Isolates from Wild Boars	Diana Meemken, Thomas Blaha, Helmut Hotzel, Birgit Strommenger, Guenter Klein, Ralf Ehrlich, Stefan Monecke, Corinna Kehrenberg	1739–1742
<b>MYCOLOGY</b>		
Nutrient Environments Influence Competition among <i>Aspergillus flavus</i> Genotypes	Hillary L. Mehl, Peter J. Cotty	1473–1480
Prothioconazole and Prothioconazole-Desthio Activities against <i>Candida albicans</i> Sterol 14- $\alpha$ -Demethylase	Josie E. Parker, Andrew G. S. Warrillow, Hans J. Cools, Bart A. Fraaije, John A. Lucas, Katarina Rigdova, William J. Griffiths, Diane E. Kelly, Steven L. Kelly	1639–1645
<b>PHYSIOLOGY</b>		
Biomass Conversion Inhibitors Furfural and 5-Hydroxymethylfurfural Induce Formation of Messenger RNP Granules and Attenuate Translation Activity in <i>Saccharomyces cerevisiae</i>	Aya Iwaki, Takao Kawai, Yosuke Yamamoto, Shingo Izawa	1661–1667

## PLANT MICROBIOLOGY

Effects of DNA Size on Transformation and Recombination Efficiencies in *Xylella fastidiosa*

Stephanie H. Kung, Adam C. Retchless, Jessica Y. Kwan, Rodrigo P. P. Almeida 1712–1717

## PUBLIC HEALTH MICROBIOLOGY

Identification of One Novel Candidate Probiotic *Lactobacillus plantarum* Strain Active against Influenza Virus Infection in Mice by a Large-Scale Screening

Noura Kechaou, Florian Chain, Jean-Jacques Gratadoux, Sébastien Blugeon, Nicolas Bertho, Christophe Chevalier, Ronan Le Goffic, Stéphanie Courau, Pascal Molimard, Jean Marc Chatel, Philippe Langella, Luis G. Bermúdez-Humarán 1491–1499

Protective Effects of *Lactobacillus plantarum* CCFM8610 against Acute Cadmium Toxicity in Mice

Qixiao Zhai, Gang Wang, Jianxin Zhao, Xiaoming Liu, Fengwei Tian, Hao Zhang, Wei Chen 1508–1515

Predictive Models for *Escherichia coli* Concentrations at Inland Lake Beaches and Relationship of Model Variables to Pathogen Detection

Donna S. Francy, Erin A. Stelzer, Joseph W. Duris, Amie M. G. Brady, John H. Harrison, Heather E. Johnson, Michael W. Ware 1676–1688

Presence and Persistence of *Coxiella burnetii* in the Environments of Goat Farms Associated with a Q Fever Outbreak

Gilbert J. Kersh, Kelly A. Fitzpatrick, Joshua S. Self, Rachael A. Priestley, Aubree J. Kelly, R. Ryan Lash, Nicola Marsden-Haug, Randall J. Nett, Adam Bjork, Robert F. Massung, Alicia D. Anderson 1697–1703

Real-Time PCR Assays for Quantification of *qnr* Genes in Environmental Water Samples and Chicken Feces

Elisabet Marti, José Luis Balcázar 1743–1745

Survival of *Escherichia coli* O157:H7 in Soils from Vegetable Fields with Different Cultivation Patterns

Zhiyuan Yao, Gang Wei, Haizhen Wang, Laosheng Wu, Jianjun Wu, Jianming Xu 1755–1756

## ERRATA

Comparing Metabolic Functionalities, Community Structures, and Dynamics of Herbicide-Degrading Communities Cultivated with Different Substrate Concentrations

Erkin Gözdereliler, Nico Boon, Jens Aamand, Karen De Roy, Michael S. Granitsiotis, Hans-Jørgen Albrechtsen, Sebastian R. Sørensen 1760

Heterologous Carotenoid-Biosynthetic Enzymes: Functional Complementation and Effects on Carotenoid Profiles in *Escherichia coli*

Gyu Hyeon Song, Se Hyeuk Kim, Bo Hyun Choi, Se Jong Han, Pyung Cheon Lee 1761

## AUTHOR'S CORRECTION

Oligomerization of Cry11Aa from *Bacillus thuringiensis* Has an Important Role in Toxicity against *Aedes aegypti*

Carlos Muñoz-Garay, Claudia Rodríguez-Almazán, Jose N. Aguilar, Leivi Portugal, Isabel Gómez, Gloria Saab-Rincon, Mario Soberón, Alejandra Bravo 1762

## PLANT MICROBIOLOGY

Effects of DNA Size on Transformation and Recombination Efficiencies in *Xylella fastidiosa*

Stephanie H. Kung, Adam C. Retchless, Jessica Y. Kwan, Rodrigo P. P. Almeida 1712–1717

## PUBLIC HEALTH MICROBIOLOGY

Identification of One Novel Candidate Probiotic *Lactobacillus plantarum* Strain Active against Influenza Virus Infection in Mice by a Large-Scale Screening

Noura Kechaou, Florian Chain, Jean-Jacques Gratadoux, Sébastien Blugeon, Nicolas Bertho, Christophe Chevalier, Ronan Le Goffic, Stéphanie Courau, Pascal Molimard, Jean Marc Chatel, Philippe Langella, Luis G. Bermúdez-Humarán 1491–1499

Protective Effects of *Lactobacillus plantarum* CCFM8610 against Acute Cadmium Toxicity in Mice

Qixiao Zhai, Gang Wang, Jianxin Zhao, Xiaoming Liu, Fengwei Tian, Hao Zhang, Wei Chen 1508–1515

Predictive Models for *Escherichia coli* Concentrations at Inland Lake Beaches and Relationship of Model Variables to Pathogen Detection

Donna S. Francy, Erin A. Stelzer, Joseph W. Duris, Amie M. G. Brady, John H. Harrison, Heather E. Johnson, Michael W. Ware 1676–1688

Presence and Persistence of *Coxiella burnetii* in the Environments of Goat Farms Associated with a Q Fever Outbreak

Gilbert J. Kersh, Kelly A. Fitzpatrick, Joshua S. Self, Rachael A. Priestley, Aubree J. Kelly, R. Ryan Lash, Nicola Marsden-Haug, Randall J. Nett, Adam Bjork, Robert F. Massung, Alicia D. Anderson 1697–1703

Real-Time PCR Assays for Quantification of *qnr* Genes in Environmental Water Samples and Chicken Feces

Elisabet Marti, José Luis Balcázar 1743–1745

Survival of *Escherichia coli* O157:H7 in Soils from Vegetable Fields with Different Cultivation Patterns

Zhiyuan Yao, Gang Wei, Haizhen Wang, Laosheng Wu, Jianjun Wu, Jianming Xu 1755–1756

## ERRATA

Comparing Metabolic Functionalities, Community Structures, and Dynamics of Herbicide-Degrading Communities Cultivated with Different Substrate Concentrations

Erkin Gözdereliler, Nico Boon, Jens Aamand, Karen De Roy, Michael S. Granitsiotis, Hans-Jørgen Albrechtsen, Sebastian R. Sørensen 1760

Heterologous Carotenoid-Biosynthetic Enzymes: Functional Complementation and Effects on Carotenoid Profiles in *Escherichia coli*

Gyu Hyeon Song, Se Hyeuk Kim, Bo Hyun Choi, Se Jong Han, Pyung Cheon Lee 1761

## AUTHOR'S CORRECTION

Oligomerization of Cry11Aa from *Bacillus thuringiensis* Has an Important Role in Toxicity against *Aedes aegypti*

Carlos Muñoz-Garay, Claudia Rodríguez-Almazán, Jose N. Aguilar, Leivi Portugal, Isabel Gómez, Gloria Saab-Rincon, Mario Soberón, Alejandra Bravo 1762

## TABLE OF CONTENTS

### SPOTLIGHT

Articles of Significant Interest Selected from This Issue by the Editors

1763

### BIODEGRADATION

The Human Fecal Microbiota Metabolizes Deoxynivalenol and Deoxynivalenol-3-Glucoside and May Be Responsible for Urinary Deepoxy-Deoxynivalenol

Silvia W. Gratz, Gary Duncan, Anthony J. Richardson

1821–1825

### BIOTECHNOLOGY

Efficient Production of Active Polyhydroxyalkanoate Synthase in *Escherichia coli* by Coexpression of Molecular Chaperones

Nicholas M. Thomson, Azusa Saika, Kazunori Ushimaru, Smith Sangiambut, Takeharu Tsuge, David K. Summers, Easan Sivaniah

1948–1955

Development of a Continuous Bioconversion System Using a Thermophilic Whole-Cell Biocatalyst

Pham Huynh Ninh, Kohsuke Honda, Yukako Yokohigashi, Kenji Okano, Takeshi Omasa, Hisao Ohtake

1996–2001

CO-Dependent H<sub>2</sub> Production by Genetically Engineered *Thermococcus onnurineus* NA1

Min-Sik Kim, Seung Seob Bae, Yun Jae Kim, Tae Wan Kim, Jae Kyu Lim, Seong Hyuk Lee, Ae Ran Choi, Jeong Ho Jeon, Jung-Hyun Lee, Hyun Sook Lee, Sung Gyun Kang

2048–2053

### ENVIRONMENTAL MICROBIOLOGY

GacS-Dependent Regulation of Polyhydroxyalkanoate Synthesis in *Pseudomonas putida* CA-3

William J. Ryan, Niall D. O'Leary, Mark O'Mahony, Alan D. W. Dobson

1795–1802

Hydrologic and Vegetative Removal of *Cryptosporidium parvum*, *Giardia lamblia*, and *Toxoplasma gondii* Surrogate Microspheres in Coastal Wetlands

Jennifer N. Hogan, Miles E. Daniels, Fred G. Watson, Stori C. Oates, Melissa A. Miller, Patricia A. Conrad, Karen Shapiro, Dane Hardin, Clare Dominik, Ann Melli, David A. Jessup, Woutrina A. Miller

1859–1865

New Type of Outer Membrane Vesicle Produced by the Gram-Negative Bacterium *Shewanella vesiculosa* M7<sup>T</sup>: Implications for DNA Content

Carla Pérez-Cruz, Ornella Carrión, Lidia Delgado, Gemma Martinez, Carmen López-Iglesias, Elena Mercade

1874–1881

Characterization of the Denitrification-Associated Phosphorus Uptake Properties of “*Candidatus Accumulibacter phosphatis*” Clades in Sludge Subjected to Enhanced Biological Phosphorus Removal

Jeong Myeong Kim, Hyo Jung Lee, Dae Sung Lee, Che Ok Jeon

1969–1979

RubisCO Gene Clusters Found in a Metagenome Microarray from Acid Mine Drainage

Xue Guo, Huaqun Yin, Jing Cong, Zhimin Dai, Yili Liang, Xueduan Liu

2019–2026

### ENZYMOLGY AND PROTEIN ENGINEERING

Distinct Actions by *Paenibacillus* sp. Strain E18  $\alpha$ -L-Arabinofuranosidases and Xylanase in Xylan Degradation

Pengjun Shi, Xiaoyan Chen, Kun Meng, Huoqing Huang, Yingguo Bai, Huiying Luo, Peilong Yang, Bin Yao

1990–1995

### EVOLUTIONARY AND GENOMIC MICROBIOLOGY

Phylogenetic Inferences Reveal a Large Extent of Novel Biodiversity in Chemically Rich Tropical Marine Cyanobacteria

Niclas Engene, Sarath P. Gunasekera, William H. Gerwick, Valerie J. Paul

1882–1888

## FOOD MICROBIOLOGY

- Salmonella and Escherichia coli O157:H7 Survival in Soil and Translocation into Leeks (*Allium porrum*) as Influenced by an Arbuscular Mycorrhizal Fungus (*Glomus intraradices*)**
- Joshua B. Gurtler, David D. Douds, Jr., 1813–1820  
Brian P. Dirks, Jennifer J. Quinlan,  
April M. Nicholson, John G. Phillips,  
Brendan A. Niemira
- Isolation of a Bifidogenic Peptide from the Pepsin Hydrolysate of Bovine Lactoferrin**
- Hirotsugu Oda, Hiroyuki Wakabayashi, 1843–1849  
Koji Yamauchi, Takumi Sato, Jin-  
Zhong Xiao, Fumiaki Abe, Keiji  
Iwatsuki
- Antifungal Hydroxy Fatty Acids Produced during Sourdough Fermentation: Microbial and Enzymatic Pathways, and Antifungal Activity in Bread**
- Brenna A. Black, Emanuele Zannini, 1866–1873  
Jonathan M. Curtis, Michael G. Gänzle
- Examination of Food Chain-Derived *Listeria monocytogenes* Strains of Different Serotypes Reveals Considerable Diversity in *inlA* Genotypes, Mutability, and Adaptation to Cold Temperatures**
- Jovana Kovacevic, Carolina Arguedas- 1915–1922  
Villa, Anna Wozniak, Taurai Tasara,  
Kevin J. Allen
- Comparative Genomic and Functional Analysis of *Lactobacillus casei* and *Lactobacillus rhamnosus* Strains Marketed as Probiotics**
- François P. Douillard, Angela Ribbera, 1923–1933  
Hanna M. Järvinen, Ravi Kant, Taija E.  
Pietilä, Cinzia Randazzo, Lars Paulin,  
Pia K. Laine, Cinzia Caggia, Ingemar  
von Ossowski, Justus Reunanen, Reetta  
Satokari, Seppo Salminen, Airi Palva,  
Willem M. de Vos
- Identification and Characterization of Spontaneous Deletions within the Sp11-Sp12 Prophage Region of *Escherichia coli* O157:H7 Sakai**
- Chun Chen, Carrie R. Lewis, Kakolie 1934–1941  
Goswami, Elisabeth L. Roberts, Chitrita  
DebRoy, Edward G. Dudley
- wks13, a New Biocontrol Agent for *Salmonella enterica* Serovars Enteritidis and Typhimurium in Foods: Characterization, Application, Sequence Analysis, and Oral Acute Toxicity Study**
- Hyun-Wol Kang, Jae-Won Kim, Tae- 1956–1968  
Sung Jung, Gun-Jo Woo
- Catabolism of *N*-Acetylneuraminic Acid, a Fitness Function of the Food-Borne Lactic Acid Bacterium *Lactobacillus sakei*, Involves Two Newly Characterized Proteins**
- Jamila Anba-Mondoloni, Stéphane 2012–2018  
Chaillou, Monique Zagorec, Marie-  
Christine Champomier-Vergès
- Selection for Loss of RpoS in *Cronobacter sakazakii* by Growth in the Presence of Acetate as a Carbon Source**
- Avelino Álvarez-Ordóñez, Máire 2099–2102  
Begley, Colin Hill
- In Situ* Determination of *Clostridium* Endospore Membrane Fluidity during Pressure-Assisted Thermal Processing in Combination with Nisin or Reutericyclin**
- S. Hofstetter, R. Winter, L. M. 2103–2106  
McMullen, M. G. Gänzle

## GENETICS AND MOLECULAR BIOLOGY

- The Iron-Dependent Regulator Fur Controls Pheromone Signaling Systems and Luminescence in the Squid Symbiont *Vibrio fischeri* ES114**
- Alecia N. Septer, Noreen L. Lyell, Eric 1826–1834  
V. Stabb
- Chemoreceptor VfcA Mediates Amino Acid Chemotaxis in *Vibrio fischeri***
- Caitlin A. Brennan, Cindy R. DeLoney- 1889–1896  
Marino, Mark J. Mandel
- Defining the *Bacteroides* Ribosomal Binding Site**
- Udo Wegmann, Nikki Horn, Simon R. 1980–1989  
Carding
- Dual Roles of *Pseudomonas aeruginosa* AlgE in Secretion of the Virulence Factor Alginate and Formation of the Secretion Complex**
- Zahid U. Rehman, Bernd H. A. Rehm 2002–2011
- Characterization of the Biosynthetic Genes for 10,11-Dehydrocurvularin, a Heat Shock Response-Modulating Anticancer Fungal Polyketide from *Aspergillus terreus***
- Yuquan Xu, Patricia Espinosa-Artiles, 2038–2047  
Vivien Schubert, Ya-ming Xu, Wei  
Zhang, Min Lin, A. A. Leslie  
Gunatilaka, Roderich Süßmuth, István  
Molnár

Arabinose Induces Pellicle Formation by <i>Vibrio fischeri</i>	Karen L. Visick, Kevin P. Quirke, Sheila M. McEwen	2069–2080
Characterization of an Acid-Inducible Sulfatase in <i>Salmonella enterica</i> Serovar Typhimurium	Seema Das, Swati Singh, Michael McClelland, Steven Forst, Prasad Gyaneshwar	2092–2095
<b>GEOMICROBIOLOGY</b>		
Carbon Isotope Fractionation of 11 Acetogenic Strains Grown on H <sub>2</sub> and CO <sub>2</sub>	Martin B. Blaser, Lisa K. Dreisbach, Ralf Conrad	1787–1794
Involvement of Intermediate Sulfur Species in Biological Reduction of Elemental Sulfur under Acidic, Hydrothermal Conditions	Eric S. Boyd, Gregory K. Druschel	2061–2068
<b>INVERTEBRATE MICROBIOLOGY</b>		
Specificity between Lactobacilli and Hymenopteran Hosts Is the Exception Rather than the Rule	Quinn S. McFrederick, Jamie J. Cannone, Robin R. Gutell, Katrin Kellner, Robert M. Plowes, Ulrich G. Mueller	1803–1812
Efficient Colonization of the Bean Bug <i>Riptortus pedestris</i> by an Environmentally Transmitted <i>Burkholderia</i> Symbiont	Yoshitomo Kikuchi, Isao Yumoto	2088–2091
<b>METHODS</b>		
Monitoring the Single-Cell Stress Response of the Diatom <i>Thalassiosira pseudonana</i> by Quantitative Real-Time Reverse Transcription-PCR	Xu Shi, Weimin Gao, Shih-hui Chao, Weiwen Zhang, Deirdre R. Meldrum	1850–1858
<b>MICROBIAL ECOLOGY</b>		
Methanogens and Methanogenesis in the Rumens and Ceca of Lambs Fed Two Different High-Grain-Content Diets	M. Popova, D. P. Morgavi, C. Martin	1777–1786
Influence of the Vaginal Microbiota on Toxic Shock Syndrome Toxin 1 Production by <i>Staphylococcus aureus</i>	Roderick A. MacPhee, Wayne L. Miller, Gregory B. Gloor, John K. McCormick, Jo-Anne Hammond, Jeremy P. Burton, Gregor Reid	1835–1842
Wastewater Treatment Effluent Reduces the Abundance and Diversity of Benthic Bacterial Communities in Urban and Suburban Rivers	Bradley Drury, Emma Rosi-Marshall, John J. Kelly	1897–1905
Carot-4-en-9,10-Diol, a Conidiation-Inducing Sesquiterpene Diol Produced by <i>Trichoderma virens</i> PS1-7 upon Exposure to Chemical Stress from Highly Active Iron Chelators	Mengcen Wang, Makoto Hashimoto, Yasuyuki Hashidoko	1906–1914
Interactions of Nitrifying Bacteria and Heterotrophs: Identification of a <i>Micavibrio</i> -Like Putative Predator of <i>Nitrospira</i> spp.	Jan Dolinšek, Ilias Lagkourdos, Wolfgang Wanek, Michael Wagner, Holger Daims	2027–2037
Rates of Species Accumulation and Taxonomic Diversification during Phototrophic Biofilm Development Are Controlled by both Nutrient Supply and Current Velocity	Chad A. Larson, Sophia I. Passy	2054–2060
Isolation of a Substantial Proportion of Forest Soil Bacterial Communities Detected via Pyrotag Sequencing	David VanInsberghe, Martin Hartmann, Gordon R. Stewart, William W. Mohn	2096–2098
<b>PHYSIOLOGY</b>		
Caffeate Respiration in the Acetogenic Bacterium <i>Acetobacterium woodii</i> : a Coenzyme A Loop Saves Energy for Caffeate Activation	Verena Hess, José M. González, Anutthaman Parthasarathy, Wolfgang Buckel, Volker Müller	1942–1947

**PLANT MICROBIOLOGY**

Relevance of Fucose-Rich Extracellular Polysaccharides  
Produced by *Rhizobium sullae* Strains Nodulating *Hedysarum  
coronarium* L. Legumes

Razika Gharzouli, Marie-Anne  
Carpéné, François Couderc, Ammar  
Benguedouar, Véréna Poinsot 1764–1776

Directed Construction and Analysis of a *Sinorhizobium meliloti*  
pSymA Deletion Mutant Library

Svetlana N. Yurgel, Michael W.  
Mortimer, Jennifer T. Rice, Jodi L.  
Humann, Michael L. Kahn 2081–2087

**PUBLIC HEALTH MICROBIOLOGY**

Effects of Temperature and pH on Reduction of Bacteria in a  
Point-of-Use Drinking Water Treatment Product for Emergency  
Relief

Jean-Thomas Marois-Fiset, Anne  
Carabin, Audrey Lavoie, Caetano C.  
Dorea 2107–2109

**ERRATUM**

Carriage and Fecal Counts of CTX-M-Producing *Escherichia  
coli* in Pigs: a Longitudinal Study

Katrine Hartung Hansen, Peter  
Damborg, Margit Andreasen, Søren  
Saxmose Nielsen, Luca Guardabassi 2110

## TABLE OF CONTENTS

### SPOTLIGHT

Articles of Significant Interest Selected from This Issue by the Editors	2111
--	------

### MINIREVIEW

Homeostasis and Catabolism of Choline and Glycine Betaine: Lessons from <i>Pseudomonas aeruginosa</i>	Matthew J. Wargo	2112–2120
---	------------------	-----------

### BIODEGRADATION

Cloning of a Novel Nicotine Oxidase Gene from <i>Pseudomonas</i> sp. Strain HZN6 Whose Product Nonenantioselectively Degrades Nicotine to Pseudooxynicotine	Jiguo Qiu, Yun Ma, Jing Zhang, Yuezhong Wen, Weiping Liu	2164–2171
Cytochrome P450 Initiates Degradation of <i>cis</i> -Dichloroethene by <i>Polaromonas</i> sp. Strain JS666	Shirley F. Nishino, Kwanghee A. Shin, James M. Gossett, Jim C. Spain	2263–2272
Constitutive Expression of the Cytochrome P450 EthABCD Monooxygenase System Enables Degradation of Synthetic Dialkyl Ethers in <i>Aquicola tertiaricarbonis</i> L108	Judith Schuster, Jessica Purswani, Uta Breuer, Clementina Pozo, Hauke Harms, Roland H. Müller, Thore Rohwerder	2321–2327

### BIOTECHNOLOGY

Anaerobic Sulfur Metabolism Coupled to Dissimilatory Iron Reduction in the Extremophile <i>Acidithiobacillus ferrooxidans</i>	Héctor Osorio, Stefanie Mangold, Yann Denis, Ivan Nancucheo, Mario Esparza, D. Barrie Johnson, Violaine Bonnefoy, Mark Dopson, David S. Holmes	2172–2181
Identification of Homophenylalanine Biosynthetic Genes from the Cyanobacterium <i>Nostoc punctiforme</i> PCC73102 and Application to Its Microbial Production by <i>Escherichia coli</i>	Kento Koketsu, Satoshi Mitsuhashi, Kazuhiko Tabata	2201–2208
Identification of a Cyclosporine-Specific P450 Hydroxylase Gene through Targeted Cytochrome P450 Complement (CYPome) Disruption in <i>Sebekia benihana</i>	Mi-Jin Lee, Hyun-Bum Kim, Yeo Joon Yoon, Kyuboem Han, Eung-Soo Kim	2253–2262
Microfluidic Chip-Based Detection and Intraspecies Strain Discrimination of <i>Salmonella</i> Serovars Derived from Whole Blood of Septic Mice	Adriana S. Patterson, Douglas M. Heithoff, Brian S. Ferguson, H. Tom Soh, Michael J. Mahan, Kevin W. Plaxco	2302–2311
Combined Fluxomics and Transcriptomics Analysis of Glucose Catabolism via a Partially Cyclic Pentose Phosphate Pathway in <i>Gluconobacter oxydans</i> 621H	Tanja Hanke, Katharina Nöh, Stephan Noack, Tino Polen, Stephanie Bringer, Hermann Sahm, Wolfgang Wiechert, Michael Bott	2336–2348
<i>Streptomyces lividans</i> Blastocidin S Deaminase and Its Application in Engineering a Blastocidin S-Producing Strain for Ease of Genetic Manipulation	Li Li, Jun Wu, Zixin Deng, T. Mark Zabriskie, Xinyi He	2349–2357

### ENVIRONMENTAL MICROBIOLOGY

Evolutionary Acquisition and Loss of Saxitoxin Biosynthesis in Dinoflagellates: the Second “Core” Gene, <i>sxtG</i>	Russell J. S. Orr, Anke Stüken, Shauna A. Murray, Kjetill S. Jakobsen	2128–2136
Inactivation of Pathogens in Feces by Desiccation and Urea Treatment for Application in Urine-Diverting Dry Toilets	Maria Elisa Magri, Luiz Sérgio Philippi, Björn Vinnerås	2156–2163
Genetic Diversity of <i>Cryptosporidium</i> spp. within a Remote Population of Soay Sheep on St. Kilda Islands, Scotland	L. Connelly, B. H. Craig, B. Jones, C. L. Alexander	2240–2246

Continued on following page

Transcriptomic and Genetic Analysis of Direct Interspecies Electron Transfer	Pravin Malla Shrestha, Amelia-Elena Rotaru, Zarath M. Summers, Minita Shrestha, Fanghua Liu, Derek R. Lovley	2397–2404
Survival, Sublethal Injury, and Recovery of Environmental <i>Burkholderia pseudomallei</i> in Soil Subjected to Desiccation	Eloise Larsen, James J. Smith, Robert Norton, Maree Corkeron	2424–2427
Changes in Enterococcal Populations and Related Antibiotic Resistance along a Medical Center-Wastewater Treatment Plant-River Continuum	Roland Leclercq, Kenny Oberlé, Sébastien Galopin, Vincent Cattoir, Hélène Budzinski, Fabienne Petit	2428–2434
Evaluating the Pathogenic Potential of Environmental <i>Escherichia coli</i> by Using the <i>Caenorhabditis elegans</i> Infection Model	Alexandra Merckx-Jacques, Anja Coors, Roland Brousseau, Luke Masson, Alberto Mazza, Yuan-Ching Tien, Edward Topp	2435–2445
Phylogenetic Delineation of the Novel Phylum <i>Armatimonadetes</i> (Former Candidate Division OP10) and Definition of Two Novel Candidate Divisions	K. C. Y. Lee, C. W. Herbold, P. F. Dunfield, X. C. Morgan, I. R. McDonald, M. B. Stott	2484–2487
Differential Decay of Enterococci and <i>Escherichia coli</i> Originating from Two Fecal Pollution Sources	Asja Korajkic, Brian R. McMinn, Valerie J. Harwood, Orin C. Shanks, G. Shay Fout, Nicholas J. Ashbolt	2488–2492
<b>ENZYMOLGY AND PROTEIN ENGINEERING</b>		
Characterization of a Novel Metagenome-Derived 6-Phospho- $\beta$ -Glucosidase from Black Liquor Sediment	Chunyu Yang, Yu Niu, Chunfang Li, Deyu Zhu, Wei Wang, Xinqiang Liu, Bin Cheng, Cuiqing Ma, Ping Xu	2121–2127
Thermostable Alcohol Dehydrogenase from <i>Thermococcus kodakarensis</i> KOD1 for Enantioselective Bioconversion of Aromatic Secondary Alcohols	Xi Wu, Chong Zhang, Izumi Orita, Tadayuki Imanaka, Toshiaki Fukui, Xin-Hui Xing	2209–2217
<b>EVOLUTIONARY AND GENOMIC MICROBIOLOGY</b>		
Recent Evolutionary Radiation and Host Plant Specialization in the <i>Xylella fastidiosa</i> Subspecies Native to the United States	Leonard Nunney, Danel B. Vickerman, Robin E. Bromley, Stephanie A. Russell, John R. Hartman, Lisa D. Morano, Richard Stouthamer	2189–2200
<b>FOOD MICROBIOLOGY</b>		
Quantitative Detection of Viable <i>Bifidobacterium bifidum</i> BF-1 Cells in Human Feces by Using Propidium Monoazide and Strain-Specific Primers	Junji Fujimoto, Koichi Watanabe	2182–2188
Modulation of Porcine $\beta$ -Defensins 1 and 2 upon Individual and Combined <i>Fusarium</i> Toxin Exposure in a Swine Jejunal Epithelial Cell Line	Murphy Lam-Yim Wan, Chit-Shing Jackson Woo, Kevin J. Allen, Paul C. Turner, Hani El-Nezami	2225–2232
Genome Instability in <i>Lactobacillus rhamnosus</i> GG	Wilbert Sybesma, Douwe Molenaar, Wilfred van IJcken, Koen Venema, Remco Kort	2233–2239
Influence of Therapeutic Ceftiofur Treatments of Feedlot Cattle on Fecal and Hide Prevalences of Commensal <i>Escherichia coli</i> Resistant to Expanded-Spectrum Cephalosporins, and Molecular Characterization of Resistant Isolates	John W. Schmidt, Dee Griffin, Larry A. Kuehn, Dayna M. Brichta-Harhay	2273–2283
A Hydrolase from <i>Lactobacillus sakei</i> Moonlights as a Transaminase	Quirin Sinz, Simone Freiding, Rudi F. Vogel, Wilfried Schwab	2284–2293
Stochasticity in Colonial Growth Dynamics of Individual Bacterial Cells	Konstantinos P. Koutsoumanis, Alexandra Lianou	2294–2301
Frequent Occurrence of Extended-Spectrum Beta-Lactamase- and Transferable AmpC Beta-Lactamase-Producing <i>Escherichia coli</i> on Domestic Chicken Meat in Sweden	Stefan Börjesson, Maria Egervärn, Mats Lindblad, Stina Englund	2463–2466

Genetic Determinants for Cadmium and Arsenic Resistance among <i>Listeria monocytogenes</i> Serotype 4b Isolates from Sporadic Human Listeriosis Patients	Sangmi Lee, M. Rakic-Martinez, L. M. Graves, T. J. Ward, R. M. Siletzky, S. Kathariou	2471–2476
<b>GENETICS AND MOLECULAR BIOLOGY</b>		
Hha Controls <i>Escherichia coli</i> O157:H7 Biofilm Formation by Differential Regulation of Global Transcriptional Regulators FlhDC and CsgD	Vijay K. Sharma, Bradley L. Bearson	2384–2396
Bifunctional Gene Cluster <i>InqBCDEF</i> Mediates Bacteriocin Production and Immunity with Differential Genetic Requirements	Shun Iwatani, Yuko Horikiri, Takeshi Zendo, Jiro Nakayama, Kenji Sonomoto	2446–2449
<b>INVERTEBRATE MICROBIOLOGY</b>		
Coinfection of <i>Dermacentor silvarum</i> Olenov (Acari: Ixodidae) by <i>Coxiella</i> -Like, <i>Arsenophonus</i> -Like, and <i>Rickettsia</i> -Like Symbionts	Limeng Liu, Lingxia Li, Jiannan Liu, Yonghong Hu, Zhao Liu, Lida Guo, Jingze Liu	2450–2454
Symbiont-Mediated Protection against Fungal Pathogens in Pea Aphids: a Role for Pathogen Specificity?	Benjamin J. Parker, Chelsea J. Spragg, Boran Altincicek, Nicole M. Gerardo	2455–2458
Symbiotic Characterization of <i>Vibrio fischeri</i> ES114 Mutants That Display Enhanced Luminescence in Culture	Noreen L. Lyell, Eric V. Stabb	2480–2483
<b>METHODS</b>		
Genetic Tools To Enhance the Study of Gene Function and Regulation in <i>Staphylococcus aureus</i>	Jeffrey L. Bose, Paul D. Fey, Kenneth W. Bayles	2218–2224
Development of a Rapid, Sensitive, and Field-Deployable Razor Ex BioDetection System and Quantitative PCR Assay for Detection of <i>Phymatotrichopsis omnivora</i> Using Multiple Gene Targets	M. Arif, J. Fletcher, S. M. Marek, U. Melcher, F. M. Ochoa-Corona	2312–2320
Multilocus Sequence Typing and FlaA Sequencing Reveal the Genetic Stability of <i>Campylobacter jejuni</i> Enrichment during Coculture with <i>Acanthamoeba polyphaga</i>	Petra Griekspoor, Jenny Olofsson, Diana Axelsson-Olsson, Jonas Waldenström, Björn Olsen	2477–2479
<b>MICROBIAL ECOLOGY</b>		
Thaumarchaeotal Signature Gene Distribution in Sediments of the Northern South China Sea: an Indicator of the Metabolic Intersection of the Marine Carbon, Nitrogen, and Phosphorus Cycles?	Hongyue Dang, Haixia Zhou, Jinying Yang, Huangmin Ge, Nianzhi Jiao, Xiwu Luan, Chuanlun Zhang, Martin G. Klotz	2137–2147
High Frequency of Virulence Factor Genes <i>tdh</i> , <i>trh</i> , and <i>tlh</i> in <i>Vibrio parahaemolyticus</i> Strains Isolated from a Pristine Estuary	Cassandra K. Gutierrez West, Savannah L. Klein, Charles R. Lovell	2247–2252
Glucose Triggers ATP Secretion from Bacteria in a Growth-Phase-Dependent Manner	Ippei Hironaka, Tadayuki Iwase, Shinya Sugimoto, Ken-ichi Okuda, Akiko Tajima, Katsuhiko Yanaga, Yoshimitsu Mizunoe	2328–2335
<b>MYCOLOGY</b>		
Evidence from <i>Serpula lacrymans</i> that 2,5-Dimethoxyhydroquinone Is a Lignocellulolytic Agent of Divergent Brown Rot Basidiomycetes	Premasagar Korripally, Vitaliy I. Timokhin, Carl J. Houtman, Michael D. Mozuch, Kenneth E. Hammel	2377–2383
Redundancy among Manganese Peroxidases in <i>Pleurotus ostreatus</i>	Tomer M. Salame, Doriv Knop, Dana Levinson, Oded Yarden, Yitzhak Hadar	2405–2415

## PHYSIOLOGY

Pathogenicity of Dodecyltrimethylammonium Chloride-Resistant *Salmonella enterica*

Megan J. M. Kautz, Aleksey Dvorzhinskiy, Jonathan G. Frye, Natalie Stevenson, Diane S. Herson 2371–2376

Taxis of *Pseudomonas putida* F1 toward Phenylacetic Acid Is Mediated by the Energy Taxis Receptor Aer2

Rita A. Luu, Benjamin J. Schneider, Christie C. Ho, Vasyly Nesteryuk, Stacy E. Ngwesse, Xianxian Liu, Juanito V. Parales, Jayna L. Ditty, Rebecca E. Parales 2416–2423

Direct Assessment of Metabolite Utilization by *Pseudomonas aeruginosa* during Growth on Artificial Sputum Medium

Volker Behrends, Benedikt Geier, Huw D. Williams, Jacob G. Bundy 2467–2470

## PLANT MICROBIOLOGY

Photosynthetic *Bradyrhizobium* sp. Strain ORS285 Is Capable of Forming Nitrogen-Fixing Root Nodules on Soybeans (*Glycine max*)

Eric Giraud, Lei Xu, Clémence Chaintreuil, Daniel Gargani, Djamel Gully, Michael J. Sadowsky 2459–2462

## PUBLIC HEALTH MICROBIOLOGY

Persistence of the 2009 Pandemic Influenza A (H1N1) Virus on N95 Respirators

A. D. Coulliette, K. A. Perry, J. R. Edwards, J. A. Noble-Wang 2148–2155

Genetic Relationships of *Vibrio parahaemolyticus* Isolates from Clinical, Human Carrier, and Environmental Sources in Thailand, Determined by Multilocus Sequence Analysis

Chonchanok Theethakaew, Edward J. Feil, Santiago Castillo-Ramírez, David M. Aanensen, Orasa Suthienkul, Douglas M. Neil, Robert L. Davies 2358–2370

**PHYSIOLOGY**

Pathogenicity of Dodecyltrimethylammonium Chloride-Resistant *Salmonella enterica*

Megan J. M. Kautz, Aleksey Dvorzhinskiy, Jonathan G. Frye, Natalie Stevenson, Diane S. Herson 2371–2376

Taxis of *Pseudomonas putida* F1 toward Phenylacetic Acid Is Mediated by the Energy Taxis Receptor Aer2

Rita A. Luu, Benjamin J. Schneider, Christie C. Ho, Vasyl Nesteryuk, Stacy E. Ngwesse, Xianxian Liu, Juanito V. Parales, Jayna L. Ditty, Rebecca E. Parales 2416–2423

Direct Assessment of Metabolite Utilization by *Pseudomonas aeruginosa* during Growth on Artificial Sputum Medium

Volker Behrends, Benedikt Geier, Huw D. Williams, Jacob G. Bundy 2467–2470

**PLANT MICROBIOLOGY**

Photosynthetic *Bradyrhizobium* sp. Strain ORS285 Is Capable of Forming Nitrogen-Fixing Root Nodules on Soybeans (*Glycine max*)

Eric Giraud, Lei Xu, Clémence Chaintreuil, Daniel Gargani, Djamel Gully, Michael J. Sadowsky 2459–2462

**PUBLIC HEALTH MICROBIOLOGY**

Persistence of the 2009 Pandemic Influenza A (H1N1) Virus on N95 Respirators

A. D. Coulliette, K. A. Perry, J. R. Edwards, J. A. Noble-Wang 2148–2155

Genetic Relationships of *Vibrio parahaemolyticus* Isolates from Clinical, Human Carrier, and Environmental Sources in Thailand, Determined by Multilocus Sequence Analysis

Chonchanok Theethakaew, Edward J. Feil, Santiago Castillo-Ramírez, David M. Aanensen, Orasa Suthienkul, Douglas M. Neil, Robert L. Davies 2358–2370

## TABLE OF CONTENTS

### SPOTLIGHT

Articles of Significant Interest Selected from This Issue by the Editors	2493
--	------

### BIODEGRADATION

Degradation of Sulfadiazine by <i>Microbacterium lacus</i> Strain SDZm4, Isolated from Lysimeters Previously Manured with Slurry from Sulfadiazine-Medicated Pigs	Wolfgang Tappe, Michael Herbst, Diana Hofmann, Stephan Koeppchen, Sirgit Kummer, Björn Thiele, Joost Groeneweg	2572–2577
---	--	-----------

### BIOTECHNOLOGY

Rewiring <i>Lactococcus lactis</i> for Ethanol Production	Christian Solem, Tore Dehli, Peter Ruhdal Jensen	2512–2518
New Biotransformation Process for Production of the Fragrant Compound $\gamma$ -Dodecalactone from 10-Hydroxystearate by Permeabilized <i>Waltomyces lipofer</i> Cells	Jung-Ung An, Young-Chul Joo, Deok-Kun Oh	2636–2641
Metabolic Responses of <i>Saccharomyces cerevisiae</i> to Valine and Ammonium Pulses during Four-Stage Continuous Wine Fermentations	T. Clement, M. Perez, J. R. Mouret, I. Sanchez, J. M. Sablayrolles, C. Camarasa	2749–2758
Nitrogen Removal by a Nitritation-Anammox Bioreactor at Low Temperature	Ziye Hu, Tommaso Lotti, Merle de Kreuk, Robbert Kleerebezem, Mark van Loosdrecht, Jans Kruit, Mike S. M. Jetten, Boran Kartal	2807–2812
Optimization of Magnetosome Production and Growth by the Magnetotactic Vibrio <i>Magnetovibrio blakemorei</i> Strain MV-1 through a Statistics-Based Experimental Design	Karen T. Silva, Pedro E. Leão, Fernanda Abreu, Jimmy A. López, Melissa L. Gutarra, Marcos Farina, Dennis A. Bazylinski, Denise M. G. Freire, Ulysses Lins	2823–2827
Use of Degradation Tags To Control Protein Levels in the Cyanobacterium <i>Synechocystis</i> sp. Strain PCC 6803	Brian P. Landry, Jana Stöckel, Himadri B. Pakrasi	2833–2835
New Constitutive Vectors: Useful Genetic Engineering Tools for Biocatalysis	Youqiang Xu, Fei Tao, Cuiqing Ma, Ping Xu	2836–2840

### ENVIRONMENTAL MICROBIOLOGY

Linking Microbial Community Structure to Function in Representative Simulated Systems	Ian M. Marcus, Hailey A. Wilder, Shanin J. Quazi, Sharon L. Walker	2552–2559
Norovirus Genotypes Present in Oysters and in Effluent from a Wastewater Treatment Plant during the Seasonal Peak of Infections in Ireland in 2010	Paulina Rajko-Nenow, Allison Waters, Sinéad Keaveney, John Flannery, Gráinne Tuite, Suzie Coughlan, Vincent O'Flaherty, William Doré	2578–2587
Contact Killing of Bacteria on Copper Is Suppressed if Bacterial-Metal Contact Is Prevented and Is Induced on Iron by Copper Ions	Salima Mathews, Michael Hans, Frank Mücklich, Marc Solioz	2605–2611
<i>Legionella pneumophila</i> Transcriptional Response following Exposure to CuO Nanoparticles	Jingrang Lu, Ian Struewing, Helen Y. Buse, Jiahui Kou, Howard A. Shuman, Sébastien P. Faucher, Nicholas J. Ashbolt	2713–2720

- Occurrence of Livestock-Associated Methicillin-Resistant *Staphylococcus aureus* in Turkey and Broiler Barns and Contamination of Air and Soil Surfaces in Their Vicinity
- Rapid *Microcystis* Cyanophage Gene Diversification Revealed by Long- and Short-Term Genetic Analyses of the Tail Sheath Gene in a Natural Pond
- High Diversity of Magnetotactic *Deltaproteobacteria* in a Freshwater Niche
- ENZYMOLGY AND PROTEIN ENGINEERING**
- CYP63A2, a Catalytically Versatile Fungal P450 Monooxygenase Capable of Oxidizing Higher-Molecular-Weight Polycyclic Aromatic Hydrocarbons, Alkylphenols, and Alkanes
- EVOLUTIONARY AND GENOMIC MICROBIOLOGY**
- Distribution and Origin of Oxygen-Dependent and Oxygen-Independent Forms of Mg-Protoporphyrin Monomethylester Cyclase among Phototrophic *Proteobacteria*
- Genetic Analysis of Capsular Polysaccharide Synthesis Gene Clusters from All Serotypes of *Streptococcus suis*: Potential Mechanisms for Generation of Capsular Variation
- Characterization of a Novel Pantan-Valentine Leukocidin (PVL)-Encoding Staphylococcal Phage and Its Naturally PVL-Lacking Variant
- FOOD MICROBIOLOGY**
- Colonization and Internalization of *Salmonella enterica* in Tomato Plants
- A Defined, Glucose-Limited Mineral Medium for the Cultivation of *Listeria* spp.
- Development of a Rapid Real-Time PCR Method as a Tool To Quantify Viable *Photobacterium phosphoreum* Bacteria in Salmon (*Salmo salar*) Steaks
- Effects of the Peptide Pheromone Plantaricin A and Cocultivation with *Lactobacillus sanfranciscensis* DPPMA174 on the Exoproteome and the Adhesion Capacity of *Lactobacillus plantarum* DC400
- Effect of Micro- and Nanoscale Topography on the Adhesion of Bacterial Cells to Solid Surfaces
- Phylogenetic and Molecular Analysis of Food-Borne Shiga Toxin-Producing *Escherichia coli*
- GENETICS AND MOLECULAR BIOLOGY**
- Utilization of Virus  $\phi$ Ch1 Elements To Establish a Shuttle Vector System for Halo(alkali)philic *Archaea* via Transformation of *Natrialba magadii*
- A. Friese, J. Schulz, K. Zimmermann, B.-A. Tenhagen, A. Fetsch, J. Hartung, U. Rösler 2759–2766
- Shigeo Kimura, Yoshihiko Sako, Takashi Yoshida 2789–2795
- Yinzha Wang, Wei Lin, Jinhua Li, Yongxin Pan 2813–2817
- Khajamohiddin Syed, Aleksey Porollo, Ying Wai Lam, Paul E. Grimmett, Jagjit S. Yadav 2692–2702
- Ekaterina N. Boldareva-Nuianzina, Zuzana Bláhová, Roman Sobotka, Michal Koblížek 2596–2604
- Masatoshi Okura, Daisuke Takamatsu, Fumito Maruyama, Takashi Nozawa, Ichiro Nakagawa, Makoto Osaki, Tsutomu Sekizaki, Marcelo Gottschalk, Yumi Kumagai, Shigeyuki Hamada 2796–2806
- Lynn El Haddad, Sylvain Moineau 2828–2832
- Jie Zheng, Sarah Allard, Sara Reynolds, Patricia Millner, Gabriela Arce, Robert J. Blodgett, Eric W. Brown 2494–2502
- Rudolf Schneebeli, Thomas Egli 2503–2511
- Sabrina Macé, Kelthoum Mamlouk, Stoyka Chipchakova, Hervé Prévost, Jean-Jacques Joffraud, Paw Dalgaard, Marie-France Pilet, Xavier Dousset 2612–2619
- Maria Calasso, Raffaella Di Cagno, Maria De Angelis, Daniela Campanella, Fabio Minervini, Marco Gobbetti 2657–2669
- Lillian C. Hsu, Jean Fang, Diana A. Borca-Tasciuc, Randy W. Worobo, Carmen I. Moraru 2703–2712
- Elisabeth Hauser, Alexander Mellmann, Torsten Semmler, Helen Stoeber, Lothar H. Wieler, Helge Karch, Nikole Kuebler, Angelika Fruth, Dag Harmsen, Thomas Weniger, Erhard Tietze, Herbert Schmidt 2731–2740
- M. Mayrhofer-Iro, A. Ladurner, C. Meissner, C. Derntl, M. Reiter, F. Haider, K. Dimmel, N. Rössler, R. Klein, U. Baranyi, H. Scholz, A. Witte 2741–2748

## INVERTEBRATE MICROBIOLOGY

**Use of Loop-Mediated Isothermal Amplification for Detection of *Ophiostoma clavatum*, the Primary Blue Stain Fungus Associated with *Ips acuminatus***

Caterina Villari, Jennifer A. Tomlinson, Andrea Battisti, Neil Boonham, Paolo Capretti, Massimo Faccoli 2527–2533

## METHODS

**Improved Selection of Internal Transcribed Spacer-Specific Primers Enables Quantitative, Ultra-High-Throughput Profiling of Fungal Communities**

Nicholas A. Bokulich, David A. Mills 2519–2526

## MICROBIAL ECOLOGY

**Panmictic Structure of the *Cryptosporidium parvum* Population in Irish Calves: Influence of Prevalence and Host Movement**

Valérie De Waele, Frederik Van den Broeck, Tine Huyse, Guy McGrath, Isabella Higgins, Niko Speybroeck, Marco Berzano, Pat Raleigh, Grace M. Mulcahy, Thomas M. Murphy 2534–2541

**Monitoring the Perturbation of Soil and Groundwater Microbial Communities Due to Pig Production Activities**

Pei-Ying Hong, Anthony C. Yannarell, Qinghua Dai, Melike Ekizoglu, Roderick I. Mackie 2620–2629

**Putative Antiparasite Defensive System Involving Ribosomal and Nonribosomal Oligopeptides in Cyanobacteria of the Genus *Planktothrix***

Thomas Rohrlack, Guntram Christiansen, Rainer Kurmayer 2642–2647

**Environmental Distribution and Seasonal Prevalence of *Mycobacterium ulcerans* in Southern Louisiana**

Caroline E. Hennigan, Leann Myers, Michael J. Ferris 2648–2656

**Denitrifying Alphaproteobacteria from the Arabian Sea That Express *nosZ*, the Gene Encoding Nitrous Oxide Reductase, in Oxic and Suboxic Waters**

Michael Wyman, Sylvia Hodgson, Clare Bird 2670–2681

**SUP05 Dominates the Gammaproteobacterial Sulfur Oxidizer Assemblages in Pelagic Redoxclines of the Central Baltic and Black Seas**

Sabine Glaubitz, Katrin Kießlich, Christian Meeske, Matthias Labrenz, Klaus Jürgens 2767–2776

**Revisiting Methanotrophic Communities in Sewage Treatment Plants**

Adrian Ho, Siegfried E. Vlaeminck, Katharina F. Ettwig, Bellinda Schneider, Peter Frenzel, Nico Boon 2841–2846

## MYCOLOGY

**Syringyl-Rich Lignin Renders Poplars More Resistant to Degradation by Wood Decay Fungi**

Oleksandr Skyba, Carl J. Douglas, Shawn D. Mansfield 2560–2571

**Light-Dependent Functions of the *Fusarium fujikuroi* CryD DASH Cryptochrome in Development and Secondary Metabolism**

Marta Castrillo, Jorge García-Martínez, Javier Avalos 2777–2788

## PHYSIOLOGY

**Phosphotransferase System-Mediated Glucose Uptake Is Repressed in Phosphoglucoisomerase-Deficient *Corynebacterium glutamicum* Strains**

Steffen N. Lindner, Dimitar P. Petrov, Christian T. Hagmann, Alexander Henrich, Reinhard Krämer, Bernhard J. Eikmanns, Volker F. Wendisch, Gerd M. Seibold 2588–2595

***Shewanella* spp. Use Acetate as an Electron Donor for Denitrification but Not Ferric Iron or Fumarate Reduction**

Sukhwan Yoon, Robert A. Sanford, Frank E. Löffler 2818–2822

**PLANT MICROBIOLOGY**

**Genome Analysis Suggests that the Soil Oligotrophic Bacterium *Agromonas oligotrophica* (*Bradyrhizobium oligotrophicum*) Is a Nitrogen-Fixing Symbiont of *Aeschynomene indica***

Takashi Okubo, Shohei Fukushima, Manabu Itakura, Kenshiro Oshima, Aphakorn Longtonglang, Neung Teaumroong, Hisayuki Mitsui, Masahira Hattori, Reiko Hattori, Tsutomu Hattori, Kiwamu Minamisawa 2542–2551

**PUBLIC HEALTH MICROBIOLOGY**

**Cross-Sectional Study Reveals High Prevalence of *Clostridium difficile* Non-PCR Ribotype 078 Strains in Australian Veal Calves at Slaughter**

Daniel R. Knight, Sara Thean, Papanin Putsathit, Stan Fenwick, Thomas V. Riley 2630–2635

**Evaluation of Bovine Feces-Associated Microbial Source Tracking Markers and Their Correlations with Fecal Indicators and Zoonotic Pathogens in a Brisbane, Australia, Reservoir**

W. Ahmed, T. Sritharan, A. Palmer, J. P. S. Sidhu, S. Toze 2682–2691

**Kinetics of Ozone Inactivation of Infectious Prion Protein**

Ning Ding, Norman F. Neumann, Luke M. Price, Shannon L. Braithwaite, Aru Balachandran, Gordon Mitchell, Miodrag Belosevic, Mohamed Gamal El-Din 2721–2730

**ERRATUM**

**Microbial Mechanisms Mediating Increased Soil C Storage under Elevated Atmospheric N Deposition**

Sarah D. Eisenlord, Zachary Freedman, Donald R. Zak, Kai Xue, Zhili He, Jizhong Zhou 2847

## TABLE OF CONTENTS

### SPOTLIGHT

Articles of Significant Interest Selected from This Issue by the Editors	2849
--	------

### BIOTECHNOLOGY

Multiple Propionyl Coenzyme A-Supplying Pathways for Production of the Bioplastic Poly(3-Hydroxybutyrate-co-3-Hydroxyvalerate) in <i>Haloferax mediterranei</i>	Jing Han, Jing Hou, Fan Zhang, Guomin Ai, Ming Li, Shuangfeng Cai, Hailong Liu, Lei Wang, Zejian Wang, Siliang Zhang, Lei Cai, Dahe Zhao, Jian Zhou, Hua Xiang	2922–2931
Anaerobic $\alpha$ -Amylase Production and Secretion with Fumarate as the Final Electron Acceptor in <i>Saccharomyces cerevisiae</i>	Zihe Liu, Tobias Österlund, Jin Hou, Dina Petranovic, Jens Nielsen	2962–2967
Metabolic Engineering for L-Glutamine Overproduction by Using DNA Gyrase Mutations in <i>Escherichia coli</i>	Mikiro Hayashi, Kazuhiko Tabata	3033–3039
Establishment of Cellobiose Utilization for Lipid Production in <i>Rhodococcus opacus</i> PD630	Stephan Hetzler, Alexander Steinbüchel	3122–3125

### ENVIRONMENTAL MICROBIOLOGY

Characteristics of Extended-Spectrum $\beta$ -Lactamase- and Carbapenemase-Producing <i>Enterobacteriaceae</i> Isolates from Rivers and Lakes in Switzerland	Katrin Zurfluh, Herbert Hächler, Magdalena Nüesch-Inderbinen, Roger Stephan	3021–3026
Novel Rod-Shaped Magnetotactic Bacteria Belonging to the Class <i>Alphaproteobacteria</i>	Wen-Yan Zhang, Ke Zhou, Hong-Miao Pan, Hai-Jian Du, Yi-Ran Chen, Rui Zhang, Wanneng Ye, Chaojing Lu, Tian Xiao, Long-Fei Wu	3137–3140
Effect of Tannic Acid on the Transcriptome of the Soil Bacterium <i>Pseudomonas protegens</i> Pf-5	Chee Kent Lim, Anahit Penesyan, Karl A. Hassan, Joyce E. Loper, Ian T. Paulsen	3141–3145

### ENZYMOLGY AND PROTEIN ENGINEERING

Role of PelF in Pel Polysaccharide Biosynthesis in <i>Pseudomonas aeruginosa</i>	Aamir Ghafoor, Zoe Jordens, Bernd H. A. Rehm	2968–2978
Fusion of an Oligopeptide to the N Terminus of an Alkaline $\alpha$ -Amylase from <i>Alkalimonas amylolytica</i> Simultaneously Improves the Enzyme's Catalytic Efficiency, Thermal Stability, and Resistance to Oxidation	Haiquan Yang, Xinyao Lu, Long Liu, Jianghua Li, Hyun-dong Shin, Rachel R. Chen, Guocheng Du, Jian Chen	3049–3058
Bioengineering of Bacterial Polymer Inclusions Catalyzing the Synthesis of N-Acetylneuraminic Acid	David O. Hooks, Paul A. Blatchford, Bernd H. A. Rehm	3116–3121

### FOOD MICROBIOLOGY

Physicochemical Quality and Chemical Safety of Chlorine as a Reconditioning Agent and Wash Water Disinfectant for Fresh-Cut Lettuce Washing	Sam Van Haute, Imca Sampers, Kevin Holvoet, Mieke Uyttendaele	2850–2861
No Protective Effects of High-Dosage Dietary Zinc Oxide on Weaned Pigs Infected with <i>Salmonella enterica</i> Serovar Typhimurium DT104	Pawel Janczyk, Susanne Kreuzer, Jens Assmus, Karsten Nöckler, Gudrun A. Brockmann	2914–2921
Genome Sequencing Identifies Two Nearly Unchanged Strains of Persistent <i>Listeria monocytogenes</i> Isolated at Two Different Fish Processing Plants Sampled 6 Years Apart	Anne Holch, Kristen Webb, Oksana Lukjancenko, David Ussery, Benjamin M. Rosenthal, Lone Gram	2944–2951

<b>Ruminant Rhombencephalitis-Associated <i>Listeria monocytogenes</i> Strains Constitute a Genetically Homogeneous Group Related to Human Outbreak Strains</b>	Paulo Ricardo Dell'Armeline Rocha, Sara Lomonaco, Maria Teresa Bottero, Alessandra Dalmasso, Alessandro Dondo, Carla Grattarola, Fabio Zuccon, Barbara Iulini, Stephen John Knabel, Maria Teresa Capucchio, Cristina Casalone	3059–3066
<b>Searching for Genes Responsible for Patulin Degradation in a Biocontrol Yeast Provides Insight into the Basis for Resistance to This Mycotoxin</b>	G. Ianiri, A. Idnurm, S. A. I. Wright, R. Durán-Patrón, L. Mannina, R. Ferracane, A. Ritieni, R. Castoria	3101–3115
<b>Behavior of <i>Escherichia coli</i> in a Heterogeneous Gelatin-Dextran Mixture</b>	K. Boons, L. Mertens, E. Van Derlinden, C. C. David, J. Hofkens, J. F. Van Impe	3126–3128
<b>GENETICS AND MOLECULAR BIOLOGY</b>		
<b>Biochemical and Genetic Characterization of the <i>Enterococcus faecalis</i> Oxaloacetate Decarboxylase Complex</b>	Guillermo D. Repizo, Víctor S. Blancato, Pablo Mortera, Juke S. Lolkema, Christian Magni	2882–2890
<b>Comparative Transcriptomic Analysis of the <i>Burkholderia cepacia</i> Tyrosine Kinase <i>bceF</i> Mutant Reveals a Role in Tolerance to Stress, Biofilm Formation, and Virulence</b>	Ana S. Ferreira, Inês N. Silva, Vítor H. Oliveira, Jörg D. Becker, Michael Givskov, Robert P. Ryan, Fábio Fernandes, Leonilde M. Moreira	3009–3020
<b>GEOMICROBIOLOGY</b>		
<b><i>Geobacillus thermoglucosidasius</i> Endospores Function as Nuclei for the Formation of Single Calcite Crystals</b>	Rie Murai, Naoto Yoshida	3085–3090
<b>INVERTEBRATE MICROBIOLOGY</b>		
<b>Characterization of the Achromobactin Iron Acquisition Operon in <i>Sodalis glossinidius</i></b>	Caitlin L. Smith, Brian L. Weiss, Serap Aksoy, Laura J. Runyen-Janecky	2872–2881
<b>Evolution, Multiple Acquisition, and Localization of Endosymbionts in Bat Flies (Diptera: Hippoboscoidea: Streblidae and Nycteribiidae)</b>	Solon F. Morse, Sarah E. Bush, Bruce D. Patterson, Carl W. Dick, Matthew E. Gruwell, Katharina Dittmar	2952–2961
<b>METHODS</b>		
<b>Simultaneous Quantification of Multiple Food- and Waterborne Pathogens by Use of Microfluidic Quantitative PCR</b>	Satoshi Ishii, Takahiro Segawa, Satoshi Okabe	2891–2898
<b>Evaluating the Assignment of <i>alkB</i> Terminal Restriction Fragments and Sequence Types to Distinct Bacterial Taxa</b>	Julia Giebler, Lukas Y. Wick, Michael Schloter, Hauke Harms, Antonis Chatzinotas	3129–3132
<b>Two-Plasmid Vector System for Independently Controlled Expression of Green and Red Fluorescent Fusion Proteins in <i>Staphylococcus aureus</i></b>	Anthony J. Brzoska, Neville Firth	3133–3136
<b>MICROBIAL ECOLOGY</b>		
<b>Predation in Homogeneous and Heterogeneous Phage Environments Affects Virulence Determinants of <i>Pseudomonas aeruginosa</i></b>	Zeinab Hosseinidoust, Nathalie Tufenkji, Theo G. M. van de Ven	2862–2871
<b>Comparative Genomic Analysis of Phylogenetically Closely Related <i>Hydrogenobaculum</i> sp. Isolates from Yellowstone National Park</b>	Christine Romano, Seth D'Imperio, Tanja Woyke, Konstantinos Mavromatis, Roger Lasken, Everett L. Shock, Timothy R. McDermott	2932–2943

<b>Comparison of the Compositions of the Stool Microbiotas of Infants Fed Goat Milk Formula, Cow Milk-Based Formula, or Breast Milk</b>	Gerald W. Tannock, Blair Lawley, Karen Munro, Siva Gowri Pathmanathan, Shao J. Zhou, Maria Makrides, Robert A. Gibson, Thomas Sullivan, Colin G. Prosser, Dianne Lowry, Alison J. Hodgkinson	3040–3048
<b>Autotrophic Growth of Bacterial and Archaeal Ammonia Oxidizers in Freshwater Sediment Microcosms Incubated at Different Temperatures</b>	Yucheng Wu, Xiubin Ke, Marcela Hernández, Baozhan Wang, Marc G. Dumont, Zhongjun Jia, Ralf Conrad	3076–3084
<b>MYCOLOGY</b>		
<b>Susceptibility of Intact Germinating <i>Arabidopsis thaliana</i> to Human Fungal Pathogens <i>Cryptococcus neoformans</i> and <i>C. gattii</i></b>	Katherine M. Warpeha, Yoon-Dong Park, Peter R. Williamson	2979–2988
<b>PHYSIOLOGY</b>		
<b>Development of a Transferable Bimolecular Fluorescence Complementation System for the Investigation of Interactions between Poly(3-Hydroxybutyrate) Granule-Associated Proteins in Gram-Negative Bacteria</b>	Daniel Pfeiffer, Dieter Jendrossek	2989–2999
<b>Atypical Glycolysis in <i>Clostridium thermocellum</i></b>	Jilai Zhou, Daniel G. Olson, D. Aaron Argyros, Yu Deng, Walter M. van Gulik, Johannes P. van Dijken, Lee R. Lynd	3000–3008
<b>Proline Availability Regulates Proline-4-Hydroxylase Synthesis and Substrate Uptake in Proline-Hydroxylating Recombinant <i>Escherichia coli</i></b>	Francesco Falcioni, Lars M. Blank, Oliver Frick, Andreas Karau, Bruno Bühler, Andreas Schmid	3091–3100
<b>PLANT MICROBIOLOGY</b>		
<b>The <i>Burkholderia contaminans</i> MS14 <i>ocfC</i> Gene Encodes a Xylosyltransferase for Production of the Antifungal Occidiofungin</b>	Kuan-Chih Chen, Akshaya Ravichandran, Adam Guerrero, Peng Deng, Sonya M. Baird, Leif Smith, Shi- En Lu	2899–2905
<b>PUBLIC HEALTH MICROBIOLOGY</b>		
<b>Comparison of the Microbial Community Structures of Untreated Wastewaters from Different Geographic Locales</b>	Orin C. Shanks, Ryan J. Newton, Catherine A. Kelty, Susan M. Huse, Mitchell L. Sogin, Sandra L. McLellan	2906–2913
<b>Prevalence of Extended-Spectrum <math>\beta</math>-Lactamase-Producing <i>Escherichia coli</i> on Bavarian Dairy and Beef Cattle Farms</b>	A. Schmid, S. Hörmansdorfer, U. Messelhäuser, A. Käsbohrer, C. Sauter- Louis, R. Mansfeld	3027–3032
<b>Occurrence, Genetic Diversity, and Persistence of Enterococci in a Lake Superior Watershed</b>	Qinghong Ran, Brian D. Badgley, Nicholas Dillon, Gary M. Dunny, Michael J. Sadowsky	3067–3075
<b>AUTHOR'S CORRECTION</b>		
<b>Multi-Virulence-Locus Sequence Typing of <i>Listeria monocytogenes</i></b>	Wei Zhang, Bhushan M. Jayarao, Stephen J. Knabel	3146

Cover photograph (Copyright © 2013, American Society for Microbiology. All Rights Reserved): Localization of *Staphylococcus aureus* cell division proteins by using fluorescent protein fusions. Red fluorescent protein (RFP) and green fluorescent protein (GFP) were fused to cell division initiator FtsZ and nucleoid occlusion factor Noc, respectively, and the location of each fusion protein in living *S. aureus* cells was visualized. Staphylococcal nucleoids were stained with 4',6-diamidino-2-phenylindole (DAPI; shown in blue). Upper row, left to right: FtsZ-RFP, Noc-GFP; middle row, left to right: merge of FtsZ-RFP and DAPI stain, merge of Noc-GFP and DAPI stain; lower row, left to right: merge of FtsZ-RFP and Noc-GFP, merge of FtsZ-RFP, Noc-GFP, and DAPI stain. (See related article on page 3133.)

## TABLE OF CONTENTS

### SPOTLIGHT

Articles of Significant Interest Selected from This Issue by the Editors	3147
--	------

### MINIREVIEW

High-Throughput Sequencing and Metagenomics: Moving Forward in the Culture-Independent Analysis of Food Microbial Ecology	Danilo Ercolini	3148–3155
---	-----------------	-----------

### BIOTECHNOLOGY

Deletion of <i>FPSI</i> , Encoding Aquaglyceroporin Fps1p, Improves Xylose Fermentation by Engineered <i>Saccharomyces cerevisiae</i>	Na Wei, Haiqing Xu, Soo Rin Kim, Yong-Su Jin	3193–3201
Improving <i>Escherichia coli</i> FucO for Furfural Tolerance by Saturation Mutagenesis of Individual Amino Acid Positions	Huabao Zheng, Xuan Wang, Lorraine P. Yomano, Ryan D. Geddes, Keelnatham T. Shanmugam, Lonnie O. Ingram	3202–3208

### ENVIRONMENTAL MICROBIOLOGY

Genetic Evidence for a Molybdopterin-Containing Tellurate Reductase	Joanne Theisen, Gerben J. Zylstra, Nathan Yee	3171–3175
Characterization of <i>Helicobacter pylori</i> Bacteriophage KHP30	Jumpei Uchiyama, Hiroaki Takeuchi, Shin-ichiro Kato, Keiji Gamoh, Iyo Takemura-Uchiyama, Takako Ujihara, Masanori Daibata, Shigenobu Matsuzaki	3176–3184
Assessing the Inactivation of <i>Mycobacterium avium</i> subsp. <i>paratuberculosis</i> during Composting of Livestock Carcasses	Victoria L. Tkachuk, Denis O. Krause, Tim A. McAllister, Katherine E. Buckley, Tim Reuter, Steve Hendrick, Kim H. Ominski	3215–3224
Transcriptional Response of Nitrifying Communities to Wetting of Dry Soil	Sarah A. Placella, Mary K. Firestone	3294–3302

### ENZYMOLGY AND PROTEIN ENGINEERING

Carbohydrate-Binding Module–Cyclodextrin Glycosyltransferase Fusion Enables Efficient Synthesis of 2-O-D-Glucopyranosyl-L-Ascorbic Acid with Soluble Starch as the Glycosyl Donor	Ruizhi Han, Jianghua Li, Hyun-Dong Shin, Rachel R. Chen, Guocheng Du, Long Liu, Jian Chen	3234–3240
Insights into the Assembly of the Alginate Biosynthesis Machinery in <i>Pseudomonas aeruginosa</i>	Zahid U. Rehman, Yajie Wang, M. Fata Moradali, Iain D. Hay, Bernd H. A. Rehm	3264–3272
Camphor Pathway Redux: Functional Recombinant Expression of 2,5- and 3,6-Diketocamphane Monooxygenases of <i>Pseudomonas putida</i> ATCC 17453 with Their Cognate Flavin Reductase Catalyzing Baeyer-Villiger Reactions	Hiroaki Iwaki, Stephan Grosse, Hélène Bergeron, Hannes Leisch, Krista Morley, Yoshie Hasegawa, Peter C. K. Lau	3282–3293

### FOOD MICROBIOLOGY

Persistence of <i>Vibrio parahaemolyticus</i> in the Pacific Oyster, <i>Crassostrea gigas</i> , Is a Multifactorial Process Involving Pili and Flagella but Not Type III Secretion Systems or Phase Variation	Alisha M. Agesen, Sureerat Phuvasate, Yi-Cheng Su, Claudia C. Häse	3303–3305
---	--	-----------

Characterization of a *Lactobacillus gasseri* JCM 1131<sup>T</sup>  
Lipoteichoic Acid with a Novel Glycolipid Anchor Structure

Tsukasa Shiraishi, Shin-ichi Yokota, Naoki Morita, Satoru Fukiya, Satoru Tomita, Naoto Tanaka, Sanae Okada, Atsushi Yokota 3315–3318

## GENETICS AND MOLECULAR BIOLOGY

Characterization of a Regulatory Network of Peptide Antibiotic Detoxification Modules in *Lactobacillus casei* BL23

Ainhoa Revilla-Guarinos, Susanne Gebhard, Cristina Alcántara, Anna Staroń, Thorsten Mascher, Manuel Zúñiga 3160–3170

Role of the Phenylalanine-Hydroxylating System in Aromatic Substance Degradation and Lipid Metabolism in the Oleaginous Fungus *Mortierella alpina*

Hongchao Wang, Haiqin Chen, Guangfei Hao, Bo Yang, Yun Feng, Yu Wang, Lu Feng, Jianxin Zhao, Yuanda Song, Hao Zhang, Yong Q. Chen, Lei Wang, Wei Chen 3225–3233

3' Truncation of the *GPD1* Promoter in *Saccharomyces cerevisiae* for Improved Ethanol Yield and Productivity

Wen-Tao Ding, Guo-Chang Zhang, Jing-Jing Liu 3273–3281

Identification of the Receptor-Binding Protein in Lytic *Leuconostoc pseudomesenteroides* Bacteriophages

Witold Kot, Karin Hammer, Horst Neve, Finn K. Vogensen 3311–3314

## INVERTEBRATE MICROBIOLOGY

“*Candidatus* Midichloriaceae” fam. nov. (*Rickettsiales*), an Ecologically Widespread Clade of Intracellular Alphaproteobacteria

Matteo Montagna, Davide Sasseria, Sara Epis, Chiara Bazzocchi, Claudia Vannini, Nathan Lo, Luciano Sacchi, Takema Fukatsu, Giulio Petroni, Claudio Bandi 3241–3248

## METHODS

Microbe-Dependent and Nonspecific Effects of Procedures To Eliminate the Resident Microbiota from *Drosophila melanogaster*

Emma V. Ridley, Adam C. N. Wong, Angela E. Douglas 3209–3214

## MICROBIAL ECOLOGY

Loss of Culturability of *Salmonella enterica* subsp. *enterica* Serovar Typhimurium upon Cell-Cell Contact with Human Fecal Bacteria

Gaspar Avendaño-Pérez, Carmen Pin 3257–3263

Community Microrespirometry and Molecular Analyses Reveal a Diverse Energy Economy in Great Boiling Spring and Sandy's Spring West in the U.S. Great Basin

Caitlin N. Murphy, Jeremy A. Dodsworth, Aaron B. Babbitt, Brian P. Hedlund 3306–3310

## PLANT MICROBIOLOGY

Host Exopolysaccharide Quantity and Composition Impact *Erwinia amylovora* Bacteriophage Pathogenesis

Dwayne R. Roach, David R. Sjaarda, Alan J. Castle, Antonet M. Svircev 3249–3256

## PUBLIC HEALTH MICROBIOLOGY

Prediction of Antimicrobial Activity of Synthetic Peptides by a Decision Tree Model

Felipe Lira, Pedro S. Perez, José A. Baranauskas, Sérgio R. Nozawa 3156–3159

**Cooccurrence of Free-Living Amoebae and Nontuberculous  
Mycobacteria in Hospital Water Networks, and Preferential  
Growth of *Mycobacterium avium* in *Acanthamoeba lenticulata***

Alida R. Ovrutsky, Edward D. Chan,  
Marinka Kartalija, Xiyuan Bai, Mary  
Jackson, Sara Gibbs, Joseph O.  
Falkinham III, Michael D. Iseman, Paul  
R. Reynolds, Gerald McDonnell,  
Vincent Thomas

3185-3192

## TABLE OF CONTENTS

### SPOTLIGHT

Articles of Significant Interest Selected from This Issue by the Editors	3319
--	------

### BIOTECHNOLOGY

New Insight into the Cleavage Reaction of <i>Nostoc</i> sp. Strain PCC 7120 Carotenoid Cleavage Dioxygenase in Natural and Nonnatural Carotenoids	Jinsol Heo, Se Hyeuk Kim, Pyung Cheon Lee	3336–3345
Improvement of Natamycin Production by Engineering of Phosphopantetheinyl Transferases in <i>Streptomyces chattanoogensis</i> L10	Hui Jiang, Yue-Yue Wang, Xin-Xin Ran, Wei-Ming Fan, Xin-Hang Jiang, Wen-Jun Guan, Yong-Quan Li	3346–3354
Enzymatic Synthesis of Novel Phloretin Glucosides	Ramesh Prasad Pandey, Tai Feng Li, Eun-Hee Kim, Tokutaro Yamaguchi, Yong Il Park, Joong Su Kim, Jae Kyung Sohng	3516–3521

### ENVIRONMENTAL MICROBIOLOGY

Distinctive Microbial Community Structure in Highly Stratified Deep-Sea Brine Water Columns	S. Bougouffa, J. K. Yang, O. O. Lee, Y. Wang, Z. Batang, A. Al-Suwailem, P. Y. Qian	3425–3437
Subtle Differences in Virus Composition Affect Disinfection Kinetics and Mechanisms	Thérèse Sigstam, Greg Gannon, Michele Cascella, Brian M. Pesson, Krista Rule Wigginton, Tamar Kohn	3455–3467
Culture-Independent Analysis of Aerosol Microbiology in a Metropolitan Subway System	Charles E. Robertson, Laura K. Baumgartner, J. Kirk Harris, Kristen L. Peterson, Mark J. Stevens, Daniel N. Frank, Norman R. Pace	3485–3493
Detection of Galectin-3 Interaction with Commensal Bacteria	Devon Kavanaugh, Marian Kane, Lokesh Joshi, Rita M. Hickey	3507–3510

### ENZYMOLGY AND PROTEIN ENGINEERING

Characterization of <i>Pseudomonas aeruginosa</i> Growth on O-Acylcarnitines and Identification of a Short-Chain Acylcarnitine Hydrolase	Jamie A. Meadows, Matthew J. Wargo	3355–3363
Improved Transferase/Hydrolase Ratio through Rational Design of a Family 1 $\beta$ -Glucosidase from <i>Thermotoga neapolitana</i>	Pontus Lundemo, Patrick Adlercreutz, Eva Nordberg Karlsson	3400–3405

### FOOD MICROBIOLOGY

Distribution and Functions of Phosphotransferase System Genes in the Genome of the Lactic Acid Bacterium <i>Oenococcus oeni</i>	Zohra Jamal, Cécile Miot-Sertier, François Thibau, Lucie Dutilh, Aline Lonvaud-Funel, Patricia Ballestra, Claire Le Marrec, Marguerite Dols-Lafargue	3371–3379
Characterization of a Wild, Novel Nisin A-Producing <i>Lactococcus</i> Strain with an <i>L. lactis</i> subsp. <i>cremoris</i> Genotype and an <i>L. lactis</i> subsp. <i>lactis</i> Phenotype, Isolated from Greek Raw Milk	Maria Parapouli, Céline Delbès-Paus, Athanasia Kakouri, Anna-Irini Koukkou, Marie-Christine Montel, John Samelis	3476–3484

**Inactivation of the *panE* Gene in *Lactococcus lactis* Enhances Formation of Cheese Aroma Compounds**

Luz P. Gómez de Cadiñanos, Tomás García-Cayuela, Mireille Yvon, M. Carmen Martínez-Cuesta, Carmen Peláez, Teresa Requena 3503–3506

**GENETICS AND MOLECULAR BIOLOGY**

**Function-Based Classification of Carbohydrate-Active Enzymes by Recognition of Short, Conserved Peptide Motifs**

Peter Kamp Busk, Lene Lange 3380–3391

**Identification and Expression of Genes Involved in the Conversion of Daidzein and Genistein by the Equol-Forming Bacterium *Slackia isoflavoniconvertens***

Christine Schröder, Anastasia Matthies, Wolfram Engst, Michael Blaut, Annett Braune 3494–3502

**A Pathway Closely Related to the D-Tagatose Pathway of Gram-Negative Enterobacteria Identified in the Gram-Positive Bacterium *Bacillus licheniformis***

Edwige Van der Heiden, Michaël Delmarcelle, Sarah Lebrun, Régine Freichels, Alain Brans, Christian M. Vastenavond, Moreno Galleni, Bernard Joris 3511–3515

**GEOMICROBIOLOGY**

**Microbial Reduction of Fe(III) under Alkaline Conditions Relevant to Geological Disposal**

Adam J. Williamson, Katherine Morris, Sam Shaw, James M. Byrne, Christopher Boothman, Jonathan R. Lloyd 3320–3326

**INVERTEBRATE MICROBIOLOGY**

**Identification and Characterization of Three Previously Undescribed Crystal Proteins from *Bacillus thuringiensis* subsp. *jegathesan***

Yunjun Sun, Qiang Zhao, Liqiu Xia, Xuezhi Ding, Quanfang Hu, Brian A. Federici, Hyun-Woo Park 3364–3370

**Mountain Pine Beetles Colonizing Historical and Naïve Host Trees Are Associated with a Bacterial Community Highly Enriched in Genes Contributing to Terpene Metabolism**

Aaron S. Adams, Frank O. Aylward, Sandye M. Adams, Nadir Erbilgin, Brian H. Aukema, Cameron R. Currie, Garret Suen, Kenneth F. Raffa 3468–3475

**METHODS**

**Development of a DNA Microarray for Molecular Identification of All 46 *Salmonella* O Serogroups**

Dan Guo, Bin Liu, Fenxia Liu, Boyang Cao, Min Chen, Xiyao Hao, Lu Feng, Lei Wang 3392–3399

**Use of Microfluidic Technology To Analyze Gene Expression during *Staphylococcus aureus* Biofilm Formation Reveals Distinct Physiological Niches**

Derek E. Moormeier, Jennifer L. Endres, Ethan E. Mann, Marat R. Sadykov, Alexander R. Horswill, Kelly C. Rice, Paul D. Fey, Kenneth W. Bayles 3413–3424

**MICROBIAL ECOLOGY**

**Assessing the Relative Effects of Geographic Location and Soil Type on Microbial Communities Associated with Straw Decomposition**

Bo Sun, Xiaoyue Wang, Feng Wang, Yuji Jiang, Xue-Xian Zhang 3327–3335

**Effects of *Bartonella* spp. on Flea Feeding and Reproductive Performance**

Danny Morick, Boris R. Krasnov, Irina S. Khokhlova, Ricardo Gutiérrez, Laura J. Fielden, Yuval Gottlieb, Shimon Harrus 3438–3443

**PLANT MICROBIOLOGY**

**Phenotype Overlap in *Xylella fastidiosa* Is Controlled by the Cyclic Di-GMP Phosphodiesterase Eal in Response to Antibiotic Exposure and Diffusile Signal Factor-Mediated Cell-Cell Signaling**

Alessandra A. de Souza, Michael Ionescu, Clelia Baccari, Aline M. da Silva, Steven E. Lindow 3444–3454

## PUBLIC HEALTH MICROBIOLOGY

- Distribution of Pathogenicity Islands OI-122, OI-43/48, and OI-57 and a High-Pathogenicity Island in Shiga Toxin-Producing *Escherichia coli*      Wenting Ju, Jinling Shen, Magaly Toro, Shaohua Zhao, Jianghong Meng      3406–3412
- Detection of *Escherichia coli* O104 in the Feces of Feedlot Cattle by a Multiplex PCR Assay Designed To Target Major Genetic Traits of the Virulent Hybrid Strain Responsible for the 2011 German Outbreak      Z. D. Paddock, J. Bai, X. Shi, D. G. Renter, T. G. Nagaraja      3522–3525
- Prevalence and Genetic Characterization of *Toxoplasma gondii* in Bats in Myanmar      Hongchao Sun, Yiyin Wang, Yingguang Zhang, Wei Ge, Fuqiang Zhang, Biao He, Zuosheng Li, Quanshui Fan, Wei Wang, Changchun Tu, Jiping Li, Quan Liu      3526–3528
- Development of a Reverse Transcription-Quantitative PCR Assay for Detection of Salivirus/Klassevirus      Eiji Haramoto, Masaaki Kitajima, Mikie Otagiri      3529–3532

## TABLE OF CONTENTS

### SPOTLIGHT

Articles of Significant Interest Selected from This Issue by the Editors	3533
--	------

### BIODEGRADATION

Identification and Characterization of a Tetramethylpyrazine Catabolic Pathway in <i>Rhodococcus jostii</i> TMP1	3649–3657
	Simonas Kutanovas, Jonita Stankeviciute, Gintaras Urbelis, Daiva Tauraite, Rasa Rutkiene, Rolandas Meskys

### BIOTECHNOLOGY

Repetitive, Marker-Free, Site-Specific Integration as a Novel Tool for Multiple Chromosomal Integration of DNA	3563–3569
	Kia Vest Petersen, Jan Martinussen, Peter Ruhdal Jensen, Christian Solem
From Waste to Plastic: Synthesis of Poly(3-Hydroxypropionate) in <i>Shimwellia blattae</i>	3582–3589
	Daniel Heinrich, Björn Andreessen, Mohamed H. Madkour, Mansour A. Al-Ghamdi, Ibrahim I. Shabbaj, Alexander Steinbüchel
Comparative Transcription Profiling and In-Depth Characterization of Plasmid-Based and Plasmid-Free <i>Escherichia coli</i> Expression Systems under Production Conditions	3802–3812
	Juergen Mairhofer, Theresa Scharl, Karoline Marisch, Monika Cserjan-Puschmann, Gerald Striedner

### ENVIRONMENTAL MICROBIOLOGY

Effect of Soil Slope on the Appearance of <i>Mycobacterium avium</i> subsp. <i>paratuberculosis</i> in Water Running off Grassland Soil after Application of Contaminated Slurry	3544–3552
	M. Salgado, M. Alfaro, F. Salazar, E. Troncoso, R. M. Mitchell, L. Ramirez, A. Naguil, P. Zamorano, M. T. Collins
Defining the Functional Potential and Active Community Members of a Sediment Microbial Community in a High-Arctic Hypersaline Subzero Spring	3637–3648
	Chih-Ying Lay, Nadia C. S. Mykytczuk, Étienne Yergeau, Guillaume Lamarche-Gagnon, Charles W. Greer, Lyle G. Whyte
Diversity of Benzylsuccinate Synthase-Like ( <i>bssA</i> ) Genes in Hydrocarbon-Polluted Marine Sediments Suggests Substrate-Dependent Clustering	3667–3676
	Alejandro Acosta-González, Ramon Rosselló-Móra, Silvia Marqués
Effects of Experimental Exclusion of Scavengers from Carcasses of Anthrax-Infected Herbivores on <i>Bacillus anthracis</i> Sporulation, Survival, and Distribution	3756–3761
	Steve E. Bellan, Peter C. B. Turnbull, Wolfgang Beyer, Wayne M. Getz
Molecular Detection of <i>Campylobacter</i> spp. and Fecal Indicator Bacteria during the Northern Migration of Sandhill Cranes ( <i>Grus canadensis</i> ) at the Central Platte River	3762–3769
	Jingrang Lu, Hodon Ryu, Jason Vogel, Jorge Santo Domingo, Nicholas J. Ashbolt
Quantifying the Responses of Mixed Rumen Microbes to Excess Carbohydrate	3786–3795
	Timothy J. Hackmann, Leanne E. Diese, Jeffrey L. Firkins
Living Side by Side with a Virus: Characterization of Two Novel Plasmids from <i>Thermococcus prieurii</i> , a Host for the Spindle-Shaped Virus TPV1	3822–3828
	Aurore Gorlas, Mart Krupovic, Patrick Forterre, Claire Geslin
Differentiation of <i>Bacillus anthracis</i> , <i>B. cereus</i> , and <i>B. thuringiensis</i> on the Basis of the <i>csaB</i> Gene Reflects Host Source	3860–3863
	Jinshui Zheng, Donghai Peng, Xiaoling Song, Lifang Ruan, Jacques Mahillon, Ming Sun
Butyrate-Producing Bacteria, Including Mucin Degraders, from the Swine Intestinal Tract	3879–3881
	Uri Y. Levine, Torey Looft, Heather K. Allen, Thad B. Stanton

## ENZYMOLGY AND PROTEIN ENGINEERING

Biochemical Diversity of Carboxyl Esterases and Lipases from Lake Arreo (Spain): a Metagenomic Approach

Mónica Martínez-Martínez, María Alcaide, Anatoli Tchigvintsev, Oleg Reva, Julio Polaina, Rafael Bargiela, María-Eugenia Guazzaroni, Álvaro Chicote, Albert Canet, Francisco Valero, Eugenio Rico Eguizabal, María del Carmen Guerrero, Alexander F. Yakunin, Manuel Ferrer 3553–3562

Characterization of Site-Specific Mutations in a Short-Chain-Length/Medium-Chain-Length Polyhydroxyalkanoate Synthase: *In Vivo* and *In Vitro* Studies of Enzymatic Activity and Substrate Specificity

Jo-Ann Chuah, Satoshi Tomizawa, Miwa Yamada, Takeharu Tsuge, Yoshiharu Doi, Kumar Sudesh, Keiji Numata 3813–3821

Synthesis of Fucosyl-*N*-Acetylglucosamine Disaccharides by Transfucosylation Using  $\alpha$ -*L*-Fucosidases from *Lactobacillus casei*

Jesús Rodríguez-Díaz, Rodrigo J. Carbajo, Antonio Pineda-Lucena, Vicente Monedero, María J. Yebra 3847–3850

Rational Design of a Novel Propeptide for Improving Active Production of *Streptomyces griseus* Trypsin in *Pichia pastoris*

Zhenmin Ling, Yi Liu, Shaolei Teng, Zhen Kang, Jingjing Zhang, Jian Chen, Guocheng Du 3851–3855

## EVOLUTIONARY AND GENOMIC MICROBIOLOGY

Comparison of 26 Sphingomonad Genomes Reveals Diverse Environmental Adaptations and Biodegradative Capabilities

Frank O. Aylward, Bradon R. McDonald, Sandra M. Adams, Alejandra Valenzuela, Rebeccah A. Schmidt, Lynne A. Goodwin, Tanja Woyke, Cameron R. Currie, Garret Suen, Michael Poulsen 3724–3733

## FOOD MICROBIOLOGY

Potato Crop as a Source of Emetic *Bacillus cereus* and Cereulide-Induced Mammalian Cell Toxicity

Douwe Hoornstra, Maria A. Andersson, Vera V. Teplova, Raimo Mikkola, Liisa M. Uotila, Leif C. Andersson, Merja Roivainen, Carl G. Gahmberg, Mirja S. Salkinoja-Salonen 3534–3543

Classification of Lytic Bacteriophages Attacking Dairy *Leuconostoc* Starter Strains

Yahya Ali, Witold Kot, Zeynep Atamer, Jörg Hinrichs, Finn K. Vogensen, Knut J. Heller, Horst Neve 3628–3636

Roles of Alkyl Hydroperoxide Reductase Subunit C (AhpC) in Viable but Nonculturable *Vibrio parahaemolyticus*

Hen-Wei Wang, Chun-Hui Chung, Tsung-Yong Ma, Hin-chung Wong 3734–3743

Prebiotic Content of Bread Prepared with Flour from Immature Wheat Grain and Selected Dextran-Producing Lactic Acid Bacteria

Olimpia Pepe, Valeria Ventorino, Silvana Cavella, Massimo Fagnano, Rachele Brugno 3779–3785

Plasmid-Borne Type E Neurotoxin Gene Clusters in *Clostridium botulinum* Strains

Zhen Zhang, Hannamari Hintsä, Ying Chen, Hannu Korkeala, Miia Lindström 3856–3859

Alternative Sigma Factor SigK Has a Role in Stress Tolerance of Group I *Clostridium botulinum* Strain ATCC 3502

Elias Dahlsten, David Kirk, Miia Lindström, Hannu Korkeala 3867–3869

Insights into the Ropy Phenotype of the Exopolysaccharide-Producing Strain *Bifidobacterium animalis* subsp. *lactis* A1dOxR

Claudio Hidalgo-Cantabrana, Borja Sánchez, Deborah Moine, Bernard Berger, Clara G. de los Reyes-Gavilán, Miguel Gueimonde, Abelardo Margolles, Patricia Ruas-Madiedo 3870–3874

## INVERTEBRATE MICROBIOLOGY

Identification of Mutations Involved in the Requirement of Potassium for Growth of Typical *Melissococcus plutonius* Strains

Daisuke Takamatsu, Rie Arai, Tohru Miyoshi-Akiyama, Kayo Okumura, Masatoshi Okura, Teruo Kirikae, Atsuko Kojima, Makoto Osaki 3882–3886

## MICROBIAL ECOLOGY

Simultaneous Catabolism of Plant-Derived Aromatic Compounds Results in Enhanced Growth for Members of the *Roseobacter* Lineage

Christopher A. Gulvik, Alison Buchan 3716–3723

Changes in the Rumen Epimural Bacterial Diversity of Beef Cattle as Affected by Diet and Induced Ruminal Acidosis

R. M. Petri, T. Schwaiger, G. B. Penner, K. A. Beauchemin, R. J. Forster, J. J. McKinnon, T. A. McAllister 3744–3755

*Leucoagaricus gongylophorus* Produces Diverse Enzymes for the Degradation of Recalcitrant Plant Polymers in Leaf-Cutter Ant Fungus Gardens

Frank O. Aylward, Kristin E. Burnum-Johnson, Susannah G. Tringe, Clotilde Teiling, Daniel M. Tremmel, Joseph A. Moeller, Jarrod J. Scott, Kerrie W. Barry, Paul D. Piehowski, Carrie D. Nicora, Stephanie A. Malfatti, Matthew E. Monroe, Samuel O. Purvine, Lynne A. Goodwin, Richard D. Smith, George M. Weinstock, Nicole M. Gerardo, Garret Suen, Mary S. Lipton, Cameron R. Currie 3770–3778

Functional Screening of a Metagenomic Library Reveals Operons Responsible for Enhanced Intestinal Colonization by Gut Commensal Microbes

Mi Young Yoon, Kang-Mu Lee, Yujin Yoon, Junhyeok Go, Yongjin Park, Yong-Joon Cho, Gerald W. Tannock, Sang Sun Yoon 3829–3838

## MYCOLOGY

*CmPEX6*, a Gene Involved in Peroxisome Biogenesis, Is Essential for Parasitism and Conidiation by the Sclerotial Parasite *Coniothyrium minitans*

Wei Wei, Wenjun Zhu, Jiasen Cheng, Jiatao Xie, Bo Li, Daohong Jiang, Guoqing Li, Xianhong Yi, Yanping Fu 3658–3666

Potentiation of Mycovirus Transmission by Zinc Compounds via Attenuation of Heterogenic Incompatibility in *Rosellinia necatrix*

Kenichi Ikeda, Kanako Inoue, Chiaki Kida, Takahiro Uwamori, Atsuko Sasaki, Satoko Kanematsu, Pyoyun Park 3684–3691

## PHYSIOLOGY

Physiological and Transcriptional Responses of *Saccharomyces cerevisiae* to *d*-Limonene Show Changes to the Cell Wall but Not to the Plasma Membrane

Timothy C. R. Brennan, Jens O. Krömer, Lars K. Nielsen 3590–3600

Iron and Copper Act Synergistically To Delay Anaerobic Growth of Bacteria

Lina J. Bird, Maureen L. Coleman, Dianne K. Newman 3619–3627

Bioenergetics of the Moderately Halophilic Bacterium *Halobacillus halophilus*: Composition and Regulation of the Respiratory Chain

Nadin Pade, Saskia Köcher, Markus Roeßler, Inga Hänelt, Volker Müller 3839–3846

## PLANT MICROBIOLOGY

Genetic Diversity and Geographical Distribution of Indigenous Soybean-Nodulating Bradyrhizobia in the United States

Sokichi Shiro, Syota Matsuura, Rina Saiki, Gilbert C. Sigua, Akihiro Yamamoto, Yosuke Umehara, Masaki Hayashi, Yuichi Saeki 3610–3618

Taxonomy and Distribution of Phenazine-Producing *Pseudomonas* spp. in the Dryland Agroecosystem of the Inland Pacific Northwest, United States

James A. Parejko, Dmitri V. Mavrodi, Olga V. Mavrodi, David M. Weller, Linda S. Thomashow 3887–3891

## PUBLIC HEALTH MICROBIOLOGY

- |  |   |           |
|--|---|-----------|
| <b>Genotypic Diversity and Virulence Characteristics of Clinical and Environmental <i>Vibrio vulnificus</i> Isolates from the Baltic Sea Region</b>                                  | Nadja Bier, Silke Bechlars, Susanne Diescher, Florian Klein, Gerhard Hauk, Oliver Duty, Eckhard Strauch, Ralf Dieckmann                                       | 3570–3581 |
| <b>Spatial and Temporal Variation in Enterococcal Abundance and Its Relationship to the Microbial Community in Hawaii Beach Sand and Water</b>                                       | Henglin Cui, Kun Yang, Eulyng Pagaling, Tao Yan   | 3601–3609 |
| <b>Use of Antibody Responses against Locus of Enterocyte Effacement (LEE)-Encoded Antigens To Monitor Enterohemorrhagic <i>Escherichia coli</i> Infections on Cattle Farms</b>       | Maria-Adelheid Joris, Daisy Vanrompay, Karen Verstraete, Koen De Reu, Lieven De Zutter, Eric Cox  | 3677–3683 |
| <b>Imidazoacridinone Derivatives as Efficient Sensitizers in Photoantimicrobial Chemotherapy</b>   | Aleksandra Taraszkievicz, Mariusz Grinholc, Krzysztof P. Bielawski, Anna Kawiak, Joanna Nakonieczna   | 3692–3702 |
| <b>Growth Media Simulating Ileal and Colonic Environments Affect the Intracellular Proteome and Carbon Fluxes of Enterohemorrhagic <i>Escherichia coli</i> O157:H7 Strain EDL933</b> | Sabrina Polzin, Claudia Huber, Eva Eylert, Ines Elsenhans, Wolfgang Eisenreich, Herbert Schmidt   | 3703–3715 |
| <b>Susceptibility of Murine Norovirus and Hepatitis A Virus to Electron Beam Irradiation in Oysters and Quantifying the Reduction in Potential Infection Risks</b>                   | Chandni Praveen, Brooke A. Dancho, David H. Kingsley, Kevin R. Calci, Gloria K. Meade, Kristina D. Mena, Suresh D. Pillai                                     | 3796–3801 |
| <b>Characterization of <i>bla</i><sub>SHV</sub> Genes on Plasmids from <i>Escherichia coli</i> and <i>Salmonella enterica</i> Isolates from Canadian Food Animals (2006–2007)</b>    | Jennie G. Pouget, Fiona J. Coutinho, Richard J. Reid-Smith, Patrick Boerlin   | 3864–3866 |
| <b>Comparison of Genotypes and Antibiotic Resistances of <i>Campylobacter jejuni</i> and <i>Campylobacter coli</i> on Chicken Retail Meat and at Slaughter</b>                       | Sonja Kittl, Bożena M. Korczak, Lilian Niederer, Andreas Baumgartner, Sabina Buettner, Gudrun Overesch, Peter Kuhnert   | 3875–3878 |
| <b>Identification of Potentially Diarrheagenic Atypical Enteropathogenic <i>Escherichia coli</i> Strains Present in Canadian Food Animals at Slaughter and in Retail Meats</b>       | Raven Comery, Ajitha Thanabalasuriar, Philippe Garneau, Andrea Portt, Patrick Boerlin, Richard J. Reid-Smith, Josée Harel, Amee R. Manges, Samantha Gruenheid | 3892–3896 |

## TABLE OF CONTENTS

### SPOTLIGHT

Articles of Significant Interest Selected from This Issue by the Editors

3897

### BIOTECHNOLOGY

Alga-Produced Cholera Toxin-Pfs25 Fusion Proteins as Oral Vaccines

James A. Gregory, Aaron B. Topol, David Z. Doerner, Stephen Mayfield 3917–3925

Electrochemical Investigation of a Microbial Solar Cell Reveals a Nonphotosynthetic Biocathode Catalyst

Sarah M. Strycharz-Glaven, Richard H. Glaven, Zheng Wang, Jing Zhou, Gary J. Vora, Leonard M. Tender 3933–3942

*In Vivo* Assessment of Growth and Virulence Gene Expression during Commensal and Pathogenic Lifestyles of *luxABCDE*-Tagged *Enterococcus faecalis* Strains in Murine Gastrointestinal and Intravenous Infection Models

Sabina Leanti La Rosa, Pat G. Casey, Colin Hill, Dzung B. Diep, Ingolf F. Nes, Dag A. Brede 3986–3997

Dynamics of Cathode-Associated Microbial Communities and Metabolite Profiles in a Glycerol-Fed Bioelectrochemical System

Paul G. Dennis, Falk Harnisch, Yun Kit Yeoh, Gene W. Tyson, Korneel Rabaey 4008–4014

Site-Directed Mutations in the Lanthipeptide Mutacin 1140

Shaorong Chen, Shawanda Wilson-Stanford, William Cromwell, Jeffrey D. Hillman, Adam Guerrero, Charlotte A. Allen, Joseph A. Sorg, Leif Smith 4015–4023

A Novel Muconic Acid Biosynthesis Approach by Shunting Tryptophan Biosynthesis via Anthranilate

Xinxiao Sun, Yuheng Lin, Qin Huang, Qipeng Yuan, Yajun Yan 4024–4030

Repression of Antibiotic Downregulator WblA by AdpA in *Streptomyces coelicolor*

Han-Na Lee, Jin-Su Kim, Pil Kim, Heung-Shick Lee, Eung-Soo Kim 4159–4163

Dechlorination of Chloral Hydrate Is Influenced by the Biofilm Adhesin Protein LapA in *Pseudomonas putida* LF54

Wanjun Zhang, Huhe, Yuanbai Pan, Masanori Toyofuku, Nobuhiko Nomura, Toshiaki Nakajima, Hiroo Uchiyama 4166–4169

### ENVIRONMENTAL MICROBIOLOGY

Molecular Characterization of CTX-M  $\beta$ -Lactamase and Associated Addiction Systems in *Escherichia coli* Circulating among Cattle, Farm Workers, and the Farm Environment

Migma Dorji Tamang, Hyang-Mi Nam, Mamata Gurung, Geum-Chan Jang, Su-Ran Kim, Suk-Chan Jung, Yong Ho Park, Suk-Kyung Lim 3898–3905

Genetic Diversity of the Flagellin Genes of *Clostridium botulinum* Groups I and II

Cedric Woudstra, Dominic Lambert, Fabrizio Anniballi, Dario De Medici, John Austin, Patrick Fach 3926–3932

A Double Staining Method Using SYTOX Green and Calcofluor White for Studying Fungal Parasites of Phytoplankton

Mélanie Gerphagnon, Delphine Latour, Jonathan Colombet, Téléphore Sime-Ngando 3943–3951

Biofilm Formation by *Psychrobacter arcticus* and the Role of a Large Adhesin in Attachment to Surfaces

Shannon M. Hinsia-Leasure, Cassandra Koid, James M. Tiedje, Janna N. Schultzhau 3967–3973

Mobile Elements in a Single-Filament Orange Guaymas Basin *Beggiatoa* (“*Candidatus Maribeggiatoa*”) sp. Draft Genome: Evidence for Genetic Exchange with Cyanobacteria

Barbara J. MacGregor, Jennifer F. Biddle, Andreas Teske 3974–3985

Physiological Changes in Rhizobia after Growth in Peat Extract May Be Related to Improved Desiccation Tolerance

Andrea Casteriano, Meredith A. Wilkes, Rosalind Deaker 3998–4007



Inactivation of Ca <sup>2+</sup> /H <sup>+</sup> Exchanger in <i>Synechocystis</i> sp. Strain PCC 6803 Promotes Cyanobacterial Calcification by Upregulating CO <sub>2</sub> -Concentrating Mechanisms	Hai-Bo Jiang, Hui-Min Cheng, Kun-Shan Gao, Bao-Sheng Qiu	4048–4055
Nitrate-Dependent Ferrous Iron Oxidation by Anaerobic Ammonium Oxidation (Anammox) Bacteria	M. Oshiki, S. Ishii, K. Yoshida, N. Fujii, M. Ishiguro, H. Satoh, S. Okabe	4087–4093
Physiological Characterization of an Anaerobic Ammonium-Oxidizing Bacterium Belonging to the “ <i>Candidatus Scalindua</i> ” Group	Takanori Awata, Mamoru Oshiki, Tomonori Kindaichi, Noriatsu Ozaki, Akiyoshi Ohashi, Satoshi Okabe	4145–4148
<b>ENZYMOLGY AND PROTEIN ENGINEERING</b>		
Improving the Thermostability and Catalytic Efficiency of <i>Bacillus deramificans</i> Pullulanase by Site-Directed Mutagenesis	Xuguo Duan, Jian Chen, Jing Wu	4072–4077
Enzymatic Synthesis and Characterization of Fructooligosaccharides and Novel Maltosylfructosides by Inulosucrase from <i>Lactobacillus gasseri</i> DSM 20604	Marina Díez-Municio, Blanca de las Rivas, Maria Luisa Jimeno, Rosario Muñoz, F. Javier Moreno, Miguel Herrero	4129–4140
ω-Transaminase from <i>Ochrobactrum anthropi</i> Is Devoid of Substrate and Product Inhibitions	Eul-Soo Park, Jong-Shik Shin	4141–4144
<b>EVOLUTIONARY AND GENOMIC MICROBIOLOGY</b>		
Distribution of cp32 Prophages among Lyme Disease-Causing Spirochetes and Natural Diversity of Their Lipoprotein-Encoding <i>erp</i> Loci	Dustin Brisson, Wei Zhou, Brandon L. Jutras, Sherwood Casjens, Brian Stevenson	4115–4128
<b>FOOD MICROBIOLOGY</b>		
Effect of Pressure-Induced Changes in the Ionization Equilibria of Buffers on Inactivation of <i>Escherichia coli</i> and <i>Staphylococcus aureus</i> by High Hydrostatic Pressure	Elisa Gayán, Santiago Condón, Ignacio Álvarez, Maria Nabakabaya, Bernard Mackey	4041–4047
Enumeration of <i>Salmonella</i> and <i>Campylobacter</i> spp. in Environmental Farm Samples and Processing Plant Carcass Rinses from Commercial Broiler Chicken Flocks	Roy D. Berghaus, Stephan G. Thayer, Bibiana F. Law, Rita M. Mild, Charles L. Hofacre, Randall S. Singer	4106–4114
Preconditioning with Cations Increases the Attachment of <i>Anoxybacillus flavithermus</i> and <i>Geobacillus</i> Species to Stainless Steel	Ben Somerton, Steve Flint, Jon Palmer, John Brooks, Denise Lindsay	4186–4190
<b>GEOMICROBIOLOGY</b>		
Bacterial Communities Associated with Subsurface Geochemical Processes in Continental Serpentinite Springs	William J. Brazelton, Penny L. Morrill, Natalie Szponar, Matthew O. Schrenk	3906–3916
U(VI) Reduction in Sulfate-Reducing Subsurface Sediments Amended with Ethanol or Acetate	Brandon J. Converse, Tao Wu, Robert H. Findlay, Eric E. Roden	4173–4177
<b>METHODS</b>		
Development of a Reverse Transcription-Quantitative PCR System for Detection and Genotyping of Aichi Viruses in Clinical and Environmental Samples	Masaaki Kitajima, Akihiko Hata, Teruo Yamashita, Eiji Haramoto, Hiroko Minagawa, Hiroyuki Katayama	3952–3958
Construction of Mobilizable Mini-Tn7 Vectors for Bioluminescent Detection of Gram-Negative Bacteria and Single-Copy Promoter <i>lux</i> Reporter Analysis	F. Heath Damron, Elizabeth S. McKenney, Mariette Barbier, George W. Liechti, Herbert P. Schweizer, Joanna B. Goldberg	4149–4153
Novel PCR-Based Methods Enhance Characterization of Vaginal Microbiota in a Bacterial Vaginosis Patient before and after Treatment	Janet A. Lambert, Apoorv Kalra, Cristina T. Dodge, Susan John, Jack D. Sobel, Robert A. Akins	4181–4185

## MICROBIAL ECOLOGY

Evidence of Microbial Regulation of Biogeochemical Cycles from a Study on Methane Flux and Land Use Change

Loïc Nazaries, Yao Pan, Levente Bodrossy, Elizabeth M. Baggs, Peter Millard, J. Colin Murrell, Brajesh K. Singh 4031–4040

Deletion of *v-chiA* from a Baculovirus Reduces Horizontal Transmission in the Field

Vincent D'Amico, James Slavicek, John D. Podgwaite, Ralph Webb, Roger Fuester, Randall A. Peiffer 4056–4064

Spatial Distribution and Factors Shaping the Niche Segregation of Ammonia-Oxidizing Microorganisms in the Qiantang River, China

Shuai Liu, Lidong Shen, Liping Lou, Guangming Tian, Ping Zheng, Baolan Hu 4065–4071

## PLANT MICROBIOLOGY

Field Evaluation of Arbuscular Mycorrhizal Fungal Colonization in *Bacillus thuringiensis* Toxin-Expressing (Bt) and Non-Bt Maize

Tanya E. Cheeke, Mitchell B. Cruzan, Todd N. Rosenstiel 4078–4086

Linked Expressions of *nap* and *nos* Genes in a *Bradyrhizobium japonicum* Mutant with Increased N<sub>2</sub>O Reductase Activity

Cristina Sánchez, Manabu Itakura, Hisayuki Mitsui, Kiwamu Minamisawa 4178–4180

## PUBLIC HEALTH MICROBIOLOGY

Close Genetic Relationship between *Legionella pneumophila* Serogroup 1 Isolates from Sputum Specimens and Puddles on Roads, as Determined by Sequence-Based Typing

Jun-ichi Kanatani, Junko Isobe, Keiko Kimata, Tomoko Shima, Miwako Shimizu, Fumiaki Kura, Tetsutaro Sata, Masanori Watahiki 3959–3966

Predicting *Salmonella* Populations from Biological, Chemical, and Physical Indicators in Florida Surface Waters

Rachel McEgan, Gabriel Mootian, Lawrence D. Goodridge, Donald W. Schaffner, Michelle D. Danyluk 4094–4105

Prevalence and Relatedness of *Escherichia coli* O157:H7 Strains in the Feces and on the Hides and Carcasses of U.S. Meat Goats at Slaughter

M. E. Jacob, D. M. Foster, A. T. Rogers, C. C. Balcomb, M. W. Sanderson 4154–4158

Virulence Profiling of Shiga Toxin-Producing *Escherichia coli* O111:NM Isolates from Cattle

Musafiri Karama, Carlton L. Gyles 4164–4165

Assessment of Virulence Factors Characteristic of Human *Escherichia coli* Pathotypes and Antimicrobial Resistance in O157:H7 and Non-O157:H7 Isolates from Livestock in Spain

A. Cabal, S. Gómez-Barrero, C. Porrero, C. Bárcena, G. López, R. Cantón, C. Gortázar, L. Domínguez, J. Álvarez 4170–4172

## TABLE OF CONTENTS

### SPOTLIGHT

Articles of Significant Interest Selected from This Issue by the Editors 4191

### BIODEGRADATION

**Benz[*a*]anthracene Biotransformation and Production of Ring Fission Products by *Sphingobium* sp. Strain KK22** Marie Kunihiro, Yasuhiro Ozeki, Yuichi Nogi, Natsuko Hamamura, Robert A. Kanaly 4410–4420

### BIOTECHNOLOGY

**Extracellular Location of *Thermobifida fusca* Cutinase Expressed in *Escherichia coli* BL21(DE3) without Mediation of a Signal Peptide** Lingqia Su, Ronald W. Woodard, Jian Chen, Jing Wu 4192–4198

**Two Novel Class II Hydrophobins from *Trichoderma* spp. Stimulate Enzymatic Hydrolysis of Poly(Ethylene Terephthalate) when Expressed as Fusion Proteins** Liliana Espino-Rammer, Doris Ribitsch, Agnieszka Przylucka, Annemarie Marold, Katrin J. Greimel, Enrique Herrero Acero, Georg M. Guebitz, Christian P. Kubicek, Irina S. Druzhinina 4230–4238

**Engineering of *Ralstonia eutropha* H16 for Autotrophic and Heterotrophic Production of Methyl Ketones** Jana Müller, Daniel MacEachran, Helcio Burd, Noppadon Sathitsuksanoh, Changhao Bi, Yi-Chun Yeh, Taek Soon Lee, Nathan J. Hillson, Swapnil R. Chhabra, Steven W. Singer, Harry R. Beller 4433–4439

**A New Large-DNA-Fragment Delivery System Based on Integrase Activity from an Integrative and Conjugative Element** Ryo Miyazaki, Jan Roelof van der Meer 4440–4447

**Increased Lysine Content Is the Main Characteristic of the Soluble Form of the Polyamide Cyanophycin Synthesized by Recombinant *Escherichia coli*** Maja Frommeyer, Alexander Steinbüchel 4474–4483

**An Engineered Strong Promoter for Streptomycetes** Weishan Wang, Xiao Li, Juan Wang, Sihai Xiang, Xiaozhou Feng, Keqian Yang 4484–4492

**Zirex: a Novel Zinc-Regulated Expression System for *Lactococcus lactis*** Dongdong Mu, Manuel Montalbán-López, Yoshimitsu Masuda, Oscar P. Kuipers 4503–4508

### ENVIRONMENTAL MICROBIOLOGY

***Salmonella enterica* Diversity in Central Californian Coastal Waterways** Sarah P. Walters, Narjol González-Escalona, Insook Son, David C. Melka, Lauren M. Sassoubre, Alexandria B. Boehm 4199–4209

**Activity and Viability of Methanogens in Anaerobic Digestion of Unsaturated and Saturated Long-Chain Fatty Acids** Diana Z. Sousa, Andreia F. Salvador, Juliana Ramos, Ana P. Guedes, Sónia Barbosa, Alfons J. M. Stams, M. Madalena Alves, M. Alcina Pereira 4239–4245

**Environmental Factors Influencing the Prevalence of a *Clostridium botulinum* Type C/D Mosaic Strain in Nonpermanent Mediterranean Wetlands** Dolors Vidal, Ibone Anza, Mark A. Taggart, Elisa Pérez-Ramírez, Elena Crespo, Ursula Hofle, Rafael Mateo 4264–4271

Insights into the Structure and Metabolic Function of Microbes That Shape Pelagic Iron-Rich Aggregates ("Iron Snow")

Shipeng Lu, Karuna Chourey, Marco Reiche, Sandor Nietzsche, Manesh B. Shah, Thomas R. Neu, Robert L. Hettich, Kirsten Küsel 4272–4281

Engineering the Soil Bacterium *Pseudomonas putida* for Arsenic Methylation

Jian Chen, Jie Qin, Yong-Guan Zhu, Víctor de Lorenzo, Barry P. Rosen 4493–4495

## ENZYMOLGY AND PROTEIN ENGINEERING

Insights into Exo- and Endoglucanase Activities of Family 6 Glycoside Hydrolases from *Podospora anserina*

Laetitia Poidevin, Julia Feliu, Annick Doan, Jean-Guy Berrin, Mathieu Bey, Pedro M. Coutinho, Bernard Henrissat, Eric Record, Senta Heiss-Blanquet 4220–4229

Characterization of a Novel Dye-Decolorizing Peroxidase (DyP)-Type Enzyme from *Irpex lacteus* and Its Application in Enzymatic Hydrolysis of Wheat Straw

Davinia Salvachúa, Alicia Prieto, Ángel T. Martínez, María Jesús Martínez 4316–4324

## EVOLUTIONARY AND GENOMIC MICROBIOLOGY

Comparative Genomics of *Bifidobacterium animalis* subsp. *lactis* Reveals a Strict Monophyletic Bifidobacterial Taxon

Christian Milani, Sabrina Duranti, Gabriele Andrea Lugli, Francesca Bottacini, Francesco Strati, Stefania Arioli, Elena Foroni, Francesca Turrone, Douwe van Sinderen, Marco Ventura 4304–4315

Investigation of the Relationship between Lactococcal Host Cell Wall Polysaccharide Genotype and 936 Phage Receptor Binding Protein Phylogeny

Jennifer Mahony, Witold Kot, James Murphy, Stuart Ainsworth, Horst Neve, Lars H. Hansen, Knut J. Heller, Søren J. Sørensen, Karin Hammer, Christian Cambillau, Finn K. Vogensen, Douwe van Sinderen 4385–4392

## FOOD MICROBIOLOGY

Uncovering the *Lactobacillus plantarum* WCFS1 Gallate Decarboxylase Involved in Tannin Degradation

Natalia Jiménez, José Antonio Curiel, Inés Reverón, Blanca de las Rivas, Rosario Muñoz 4253–4263

Garvicin A, a Novel Class IIb Bacteriocin from *Lactococcus garvieae* That Inhibits Septum Formation in *L. garvieae* Strains

Antonio Maldonado-Barragán, Nivia Cárdenas, Beatriz Martínez, José Luis Ruiz-Barba, José F. Fernández-Garayzábal, Juan M. Rodríguez, Alicia Gibello 4336–4346

Generic *Escherichia coli* Contamination of Spinach at the Preharvest Stage: Effects of Farm Management and Environmental Factors

Sangshin Park, Sarah Navratil, Ashley Gregory, Arin Bauer, Indumathi Srinath, Mikyoung Jun, Barbara Szonyi, Kendra Nightingale, Juan Anciso, Renata Ivanek 4347–4358

ProP Is Required for the Survival of Desiccated *Salmonella enterica* Serovar Typhimurium Cells on a Stainless Steel Surface

Sarah Finn, Kristian Händler, Orla Condell, Aoife Colgan, Shane Cooney, Peter McClure, Aléjandro Amézquita, Jay C. D. Hinton, Séamus Fanning 4376–4384

Mechanism of the Synergistic Inactivation of *Escherichia coli* by UV-C Light at Mild Temperatures

E. Gayán, P. Mañas, I. Álvarez, S. Condón 4465–4473

## GENETICS AND MOLECULAR BIOLOGY

A Functional Approach To Uncover the Low-Temperature Adaptation Strategies of the Archaeon *Methanosarcina barkeri*

Eoin Gunnigle, Paul McCay, Matthew Fuszard, Catherine H. Botting, Florence Abram, Vincent O'Flaherty 4210–4219

Characterization of <i>Escherichia coli</i> O157:H7 Strains Isolated from Supershedding Cattle	Terrance M. Arthur, Rafiq Ahmed, Margo Chase-Topping, Norasak Kalchayanand, John W. Schmidt, James L. Bono	4294–4303
Transkingdom Genetic Transfer from <i>Escherichia coli</i> to <i>Saccharomyces cerevisiae</i> as a Simple Gene Introduction Tool	Kazuki Moriguchi, Noritaka Edahiro, Shinji Yamamoto, Katsuyuki Tanaka, Nori Kurata, Katsunori Suzuki	4393–4400
Identification of a New P335 Subgroup through Molecular Analysis of Lactococcal Phages Q33 and BM13	Jennifer Mahony, Bruno Martel, Denise M. Tremblay, Horst Neve, Knut J. Heller, Sylvain Moineau, Douwe van Sinderen	4401–4409
Regulon Studies and <i>In Planta</i> Role of the BraI/R Quorum-Sensing System in the Plant-Beneficial <i>Burkholderia</i> Cluster	Bruna G. Coutinho, Birgit Mitter, Chouhra Talbi, Angela Sessitsch, Eulogio J. Bedmar, Nigel Halliday, Euan K. James, Miguel Cámara, Vittorio Venturi	4421–4432
<b>GEOMICROBIOLOGY</b>		
Arsenic Bioremediation by Biogenic Iron Oxides and Sulfides	Enoma O. Omoregie, Raoul-Marie Couture, Philippe Van Cappellen, Claire L. Corkhill, John M. Charnock, David A. Polya, David Vaughan, Karolien Vanbroekhoven, Jonathan R. Lloyd	4325–4335
<b>INVERTEBRATE MICROBIOLOGY</b>		
Novel <i>Rickettsiella</i> Bacterium in the Leafhopper <i>Orosius albicinctus</i> (Hemiptera: Cicadellidae)	Lilach Iasur-Kruh, Phyllis G. Weintraub, Netta Mozes-Daube, Wyatt E. Robinson, Steve J. Perlman, Einat Zchori-Fein	4246–4252
<b>METHODS</b>		
A Universally Applicable and Rapid Method for Measuring the Growth of <i>Streptomyces</i> and Other Filamentous Microorganisms by Methylene Blue Adsorption-Desorption	Marco Fischer, R. Gary Sawers	4499–4502
<b>MICROBIAL ECOLOGY</b>		
Use of Agent-Based Modeling To Explore the Mechanisms of Intracellular Phosphorus Heterogeneity in Cultured Phytoplankton	Neil D. Fredrick, John A. Berges, Benjamin S. Twining, Daliangelis Nuñez-Milland, Ferdi L. Hellweger	4359–4368
Contrasting Results of Culture-Dependent and Molecular Analyses of <i>Mycobacterium avium</i> subsp. <i>paratuberculosis</i> from Wood Bison	Taya Forde, Jeroen De Buck, Brett Elkin, Susan Kutz, Frank van der Meer, Karin Orsel	4448–4454
<b>PHYSIOLOGY</b>		
Adaptation of the Hydrocarbonoclastic Bacterium <i>Alcanivorax borkumensis</i> SK2 to Alkanes and Toxic Organic Compounds: a Physiological and Transcriptomic Approach	Daniela J. Naether, Slavtscho Slawtschew, Sebastian Stasik, Maria Engel, Martin Olzog, Lukas Y. Wick, Kenneth N. Timmis, Hermann J. Heipieper	4282–4293
Kinetic Enrichment of <sup>34</sup> S during Proteobacterial Thiosulfate Oxidation and the Conserved Role of SoxB in S-S Bond Breaking	Masrura Alam, Prosenjit Pyne, Aninda Mazumdar, Aditya Peketi, Wriddhiman Ghosh	4455–4464
<b>PLANT MICROBIOLOGY</b>		
Malonate Catabolism Does Not Drive N <sub>2</sub> Fixation in Legume Nodules	Ramakrishnan Karunakaran, Alison K. East, Philip S. Poole	4496–4498

**PUBLIC HEALTH MICROBIOLOGY**

**Occurrence of the Transferable Copper Resistance Gene *tcrB* among Fecal Enterococci of U.S. Feedlot Cattle Fed Copper-Supplemented Diets**

R. G. Amachawadi, H. M. Scott, C. A. Alvarado, T. R. Mainini, J. Vinasco, J. S. Drouillard, T. G. Nagaraja 4369–4375

**Physiological Levels of Glucose Induce Membrane Vesicle Secretion and Affect the Lipid and Protein Composition of *Yersinia pestis* Cell Surfaces**

Anna M. Kolodziejek, Allan B. Caplan, Gregory A. Bohach, Andrzej J. Paszczynski, Scott A. Minnich, Carolyn J. Hovde 4509–4514

**LETTER TO THE EDITOR**

**Syntrophic Propionate Oxidation via Butyrate: a Novel Window of Opportunity under Methanogenic Conditions**

Jan Dolfing 4515–4516

**Reply to “Syntrophic Propionate Oxidation via Butyrate: a Novel Window of Opportunity under Methanogenic Conditions”**

Yahai Lu 4517

## TABLE OF CONTENTS

### SPOTLIGHT

Articles of Significant Interest Selected from This Issue by the Editors

4519

### BIODEGRADATION

Biodegradation of Endocrine Disruptors in Solid-Liquid Two-Phase Partitioning Systems by Enrichment Cultures

Richard Villemur, Silvia Cristina Cunha dos Santos, Julianne Ouellette, Pierre Juteau, François Lépine, Eric Déziel

4701–4711

### BIOTECHNOLOGY

Development of Biotin-Prototrophic and -Hyperauxotrophic *Corynebacterium glutamicum* Strains

Masato Ikeda, Aya Miyamoto, Sumire Mutoh, Yuko Kitano, Mei Tajima, Daisuke Shirakura, Manami Takasaki, Satoshi Mitsuhashi, Seiki Takeno

4586–4594

### ENVIRONMENTAL MICROBIOLOGY

Environmental Dissolved Organic Matter Governs Biofilm Formation and Subsequent Linuron Degradation Activity of a Linuron-Degrading Bacterial Consortium

Benjamin Horemans, Philip Breugelmans, Johan Hofkens, Erik Smolders, Dirk Springael

4534–4542

Comparative Persistence of Subgroups of F-Specific RNA Phages in River Water

Yongheng Yang, Mansel W. Griffiths

4564–4567

Precipitation of Iron on the Surface of *Leptospira interrogans* Is Associated with Mutation of the Stress Response Metalloprotease HtpX

Rebekah Henry, Miranda Lo, Chenai Khoo, Hailong Zhang, Reinhard I. Boysen, Mathieu Picardeau, Gerald L. Murray, Dieter M. Bulach, Ben Adler

4653–4660

Mannitol and the Mannitol-Specific Enzyme IIB Subunit Activate *Vibrio cholerae* Biofilm Formation

Patrick Ymele-Leki, Laetitia Houot, Paula I. Watnick

4675–4683

Evidence for Coexistence of Distinct *Escherichia coli* Populations in Various Aquatic Environments and Their Survival in Estuary Water

T. Berthe, M. Ratajczak, O. Clermont, E. Denamur, F. Petit

4684–4693

### ENZYMOLGY AND PROTEIN ENGINEERING

Biotransformation of *Trichoderma* spp. and Their Tolerance to Aromatic Amines, a Major Class of Pollutants

Angélique Cocaign, Linh-Chi Bui, Philippe Silar, Laetitia Chan Ho Tong, Florent Busi, Aazdine Lamouri, Christian Mougin, Fernando Rodrigues-Lima, Jean-Marie Dupret, Julien Dairou

4719–4726

Fusion of a Flavin-Based Fluorescent Protein to Hydroxynitrile Lyase from *Arabidopsis thaliana* Improves Enzyme Stability

Kathrin Emmi Scholz, Benita Kopka, Astrid Wirtz, Martina Pohl, Karl-Erich Jaeger, Ulrich Krauss

4727–4733

### EVOLUTIONARY AND GENOMIC MICROBIOLOGY

The Genome of the Anaerobic Fungus *Orpinomyces* sp. Strain CIA Reveals the Unique Evolutionary History of a Remarkable Plant Biomass Degradator

Noha H. Youssef, M. B. Couger, Christopher G. Struchtemeyer, Audra S. Ligenstoffer, Rolf A. Prade, Fares Z. Najar, Hasan K. Atiyeh, Mark R. Wilkins, Mostafa S. Elshahed

4620–4634



## FOOD MICROBIOLOGY

Evaluation of Aerated Steam Treatment of Alfalfa and Mung Bean Seeds To Eliminate High Levels of *Escherichia coli* O157:H7 and O178:H12, *Salmonella enterica*, and *Listeria monocytogenes*

Patrick Studer, Werner E. Heller, Jörg Hummerjohann, David Drissner 4613–4619

Genotypic and Phenotypic Analysis of Dairy *Lactococcus lactis* Biodiversity in Milk: Volatile Organic Compounds as Discriminating Markers

Amandine Dhaisne, Maeva Guellerin, Valérie Laroute, Sandrine Laguerre, Muriel Cocaïgn-Bousquet, Pascal Le Bourgeois, Pascal Loubiere 4643–4652

Substantial within-Animal Diversity of *Salmonella* Isolates from Lymph Nodes, Feces, and Hides of Cattle at Slaughter

Sara E. Gragg, Guy H. Loneragan, Kendra K. Nightingale, Dayna M. Brichta-Harhay, Henry Ruiz, Jacob R. Elder, Lyda G. Garcia, Markus F. Miller, Alejandro Echeverry, Rosa G. Ramírez Porras, Mindy M. Brashears 4744–4750

Increased Water Activity Reduces the Thermal Resistance of *Salmonella enterica* in Peanut Butter

Yingshu He, Ye Li, Joelle K. Salazar, Jingyun Yang, Mary Lou Tortorello, Wei Zhang 4763–4767

## GENETICS AND MOLECULAR BIOLOGY

Identification of Critical Genes for Growth in Olive Brine by Transposon Mutagenesis of *Lactobacillus pentosus* C11

G. Perpetuini, H. Scornec, R. Tofalo, P. Serror, M. Schirone, G. Suzzi, A. Corsetti, J. F. Cavin, H. Licandro-Seraut 4568–4575

The Highly Autoaggregative and Adhesive Phenotype of the Vaginal *Lactobacillus plantarum* Strain CMPG5300 Is Sortase Dependent

Shweta Malik, Mariya I. Petrova, Ingmar J. J. Claes, Tine L. A. Verhoeven, Pieter Busschaert, Mario Vaneechoutte, Bart Lievens, Ivo Lambrichts, Roland J. Siezen, Jan Balzarini, Jos Vanderleyden, Sarah Lebeer 4576–4585

L-A-lus, a New Variant of the L-A Totivirus Found in Wine Yeasts with Klus Killer Toxin-Encoding Mlus Double-Stranded RNA: Possible Role of Killer Toxin-Encoding Satellite RNAs in the Evolution of Their Helper Viruses

Nieves Rodríguez-Cousiño, Pilar Gómez, Rosa Esteban 4661–4674

Characterization of the Genome of the Dairy *Lactobacillus helveticus* Bacteriophage  $\Phi$ AQ113

Miriam Zago, Erika Scaltriti, Lia Rossetti, Alessandro Guffanti, Angelarita Armiento, Maria Emanuela Fornasari, Stefano Grolli, Domenico Carminati, Elena Brini, Paolo Pavan, Armando Felsani, Annalisa D'Urzo, Anna Moles, Jean-Baptiste Claude, Rita Grandori, Roberto Ramoni, Giorgio Giraffa 4712–4718

Involvement of the Novel Two-Component NsrRS and LcrRS Systems in Distinct Resistance Pathways against Nisin A and Nukacin ISK-1 in *Streptococcus mutans*

Miki Kawada-Matsuo, Yuichi Oogai, Takeshi Zendo, Junichi Nagao, Yukie Shibata, Yoshihisa Yamashita, Yoshitoshi Ogura, Tetsuya Hayashi, Kenji Sonomoto, Hitoshi Komatsuzawa 4751–4755

## GEOMICROBIOLOGY

Release of Arsenic from Soil by a Novel Dissimilatory Arsenate-Reducing Bacterium, *Anaeromyxobacter* sp. Strain PSR-1

Keitaro Kudo, Noriko Yamaguchi, Tomoyuki Makino, Toshihiko Ohtsuka, Kenta Kimura, Dian Tao Dong, Seigo Amachi 4635–4642

Extracellular Electron Transfer to Fe(III) Oxides by the Hyperthermophilic Archaeon *Geoglobus ahangari* via a Direct Contact Mechanism

Michael P. Manzella, Gemma Reguera, Kazem Kashefi 4694–4700

## INVERTEBRATE MICROBIOLOGY

Differential Role of *Manduca sexta* Aminopeptidase-N and Alkaline Phosphatase in the Mode of Action of Cry1Aa, Cry1Ab, and Cry1Ac Toxins from *Bacillus thuringiensis*

Biviana Flores-Escobar, Hector Rodríguez-Magadan, Alejandra Bravo, Mario Soberón, Isabel Gómez 4543–4550

The Microbiome of the Red Sea Coral *Stylophora pistillata* Is Dominated by Tissue-Associated *Endozoicomonas* Bacteria

Till Bayer, Matthew J. Neave, Areej Alsheikh-Hussain, Manuel Aranda, Lauren K. Yum, Tracy Mincer, Konrad Hughen, Amy Apprill, Christian R. Woolstra 4759–4762

## METHODS

Functional Screening of Metagenome and Genome Libraries for Detection of Novel Flavonoid-Modifying Enzymes

U. Rabausch, J. Juergensen, N. Ilmberger, S. Böhnke, S. Fischer, B. Schubach, M. Schulte, W. R. Streit 4551–4563

Development of a *Propionibacterium-Escherichia coli* Shuttle Vector for Metabolic Engineering of *Propionibacterium jensenii*, an Efficient Producer of Propionic Acid

Xin Zhuge, Long Liu, Hyun-dong Shin, Rachel R. Chen, Jianghua Li, Guocheng Du, Jian Chen 4595–4602

Bacterial Tethering Analysis Reveals a “Run-Reverse-Turn” Mechanism for *Pseudomonas* Species Motility

Chen Qian, Chui Ching Wong, Sanjay Swarup, Keng-Hwee Chiam 4734–4743

Improved Bacterial Mutagenesis by High-Frequency Allele Exchange, Demonstrated in *Clostridium difficile* and *Streptococcus suis*

Alexandra Faulds-Pain, Brendan W. Wren 4768–4771

## MYCOLOGY

An *MSH4* Homolog, *stpp1*, from *Pleurotus pulmonarius* Is a “Silver Bullet” for Resolving Problems Caused by Spores in Cultivated Mushrooms

Yasuhito Okuda, Shigeyuki Murakami, Yoichi Honda, Teruyuki Matsumoto 4520–4527

## PHYSIOLOGY

Ca<sup>2+</sup>-Citrate Uptake and Metabolism in *Lactobacillus casei* ATCC 334

Pablo Mortera, Agata Pudlik, Christian Magni, Sergio Alarcón, Juke S. Lolkema 4603–4612

*Enterococcus faecalis* Grows on Ascorbic Acid

Ibrahim Mehmeti, Margrete Solheim, Ingolf F. Nes, Helge Holo 4756–4758

## PUBLIC HEALTH MICROBIOLOGY

Genetic Variability of Vancomycin-Resistant *Enterococcus faecium* and *Enterococcus faecalis* Isolates from Humans, Chickens, and Pigs in Malaysia

Yitbarek Getachew, Latiffah Hassan, Zunita Zakaria, Saleha Abdul Aziz 4528–4533

## TABLE OF CONTENTS

### SPOTLIGHT

Articles of Significant Interest Selected from This Issue by the Editors	4773
--	------

### BIOTECHNOLOGY

Activating Phosphoenolpyruvate Carboxylase and Phosphoenolpyruvate Carboxykinase in Combination for Improvement of Succinate Production	Zaigao Tan, Xinna Zhu, Jing Chen, Qingyan Li, Xueli Zhang	4838–4844
Roles of the Yap1 Transcription Factor and Antioxidants in <i>Saccharomyces cerevisiae</i> 's Tolerance to Furfural and 5-Hydroxymethylfurfural, Which Function as Thiol-Reactive Electrophiles Generating Oxidative Stress	Daehee Kim, Ji-Sook Hahn	5069–5077

### ENVIRONMENTAL MICROBIOLOGY

Transcriptome Sequencing (RNA-seq) Analysis of the Effects of Metal Nanoparticle Exposure on the Transcriptome of <i>Chlamydomonas reinhardtii</i>	Dana F. Simon, Rute F. Domingos, Charles Hauser, Colin M. Hutchins, William Zerges, Kevin J. Wilkinson	4774–4785
Lytic Infection of <i>Lactococcus lactis</i> by Bacteriophages Tuc2009 and c2 Triggers Alternative Transcriptional Host Responses	Stuart Ainsworth, Aldert Zomer, Jennifer Mahony, Douwe van Sinderen	4786–4798
Dispersal and Survival of <i>Flavobacterium psychrophilum</i> Phages <i>In Vivo</i> in Rainbow Trout and <i>In Vitro</i> under Laboratory Conditions: Implications for Their Use in Phage Therapy	Lone Madsen, Sif K. Bertelsen, Inger Dalsgaard, Mathias Middelboe	4853–4861
Molecular Characterization of “ <i>Candidatus Similichlamydia latridicola</i> ” gen. nov., sp. nov. ( <i>Chlamydiales</i> : “ <i>Candidatus Parilichlamydiaceae</i> ”), a Novel <i>Chlamydia</i> -Like Epitheliocystis Agent in the Striped Trumpeter, <i>Latris lineata</i> (Forster)	M. C. Stride, A. Polkinghorne, T. L. Miller, B. F. Nowak	4914–4920
Oxygen Consumption Rates of Bacteria under Nutrient-Limited Conditions	Timothy E. Riedel, William M. Berelson, Kenneth H. Nealson, Steven E. Finkel	4921–4931
Litter Supply as a Driver of Microbial Activity and Community Structure on Decomposing Leaves: a Test in Experimental Streams	Aline Frossard, Linda Gerull, Michael Mutz, Mark O. Gessner	4965–4973
Molecular Epidemiology of Newcastle Disease in Mexico and the Potential Spillover of Viruses from Poultry into Wild Bird Species	Stivalis Cardenas Garcia, Roberto Navarro Lopez, Romeo Morales, Miguel A. Olvera, Miguel A. Marquez, Ruben Merino, Patti J. Miller, Claudio L. Afonso	4985–4992
Real-Time PCR for Quantitative Analysis of Human Commensal <i>Escherichia coli</i> Populations Reveals a High Frequency of Subdominant Phylogroups	Mounira Smati, Olivier Clermont, Frédéric Le Gal, Olivier Schichmanoff, Françoise Jauréguy, Alain Eddi, Erick Denamur, Bertrand Picard, for the Coliville Group	5005–5012
Acetate Production from Oil under Sulfate-Reducing Conditions in Bioreactors Injected with Sulfate and Nitrate	Cameron M. Callbeck, Akhil Agrawal, Gerrit Voordouw	5059–5068
PCR Characterization Suggests that an Unusual Range of <i>Bartonella</i> Species Infect the Striped Field Mouse ( <i>Apodemus agrarius</i> ) in Central Europe	Joanna Hildebrand, Anna Paziewska-Harris, Grzegorz Zaleśny, Philip D. Harris	5082–5084

*Clostridium perfringens* Is Not Suitable for the Indication of Fecal Pollution from Ruminant Wildlife but Is Associated with Excreta from Nonherbivorous Animals and Human Sewage

J. Vierheilig, C. Frick, R. E. Mayer, A. K. T. Kirschner, G. H. Reischer, J. Derx, R. L. Mach, R. Sommer, A. H. Farnleitner 5089–5092

## ENZYMOLGY AND PROTEIN ENGINEERING

L-Amino Acid Ligase from *Pseudomonas syringae* Producing Tabtoxin Can Be Used for Enzymatic Synthesis of Various Functional Peptides

Toshinobu Arai, Yasuhiro Arimura, Shun Ishikura, Kuniki Kino 5023–5029

Engineering the *meso*-Diaminopimelate Dehydrogenase from *Symbiobacterium thermophilum* by Site Saturation Mutagenesis for D-Phenylalanine Synthesis

Xiuzhen Gao, Fang Huang, Jinhui Feng, Xi Chen, Hailing Zhang, Zhixiang Wang, Qiaqing Wu, Dunming Zhu 5078–5081

## EVOLUTIONARY AND GENOMIC MICROBIOLOGY

Proposed Model for the High Rate of Rearrangement and Rapid Migration Observed in Some IncA/C Plasmid Lineages

R. J. Meinersmann, R. L. Lindsey, J. L. Bono, T. P. Smith, B. B. Oakley 4806–4814

Sequence Variability of P2-Like Prophage Genomes Carrying the Cytolethal Distending Toxin V Operon in *Escherichia coli* O157

Domonkos Sváb, Balázs Horváth, Gergely Maróti, Ulrich Dobrindt, István Tóth 4958–4964

Biosynthesis of the Osmoprotectant Ectoine, but Not Glycine Betaine, Is Critical for Survival of Osmotically Stressed *Vibrio parahaemolyticus* Cells

Serge Y. Ongagna-Yhombi, E. Fidelma Boyd 5038–5049

## FOOD MICROBIOLOGY

Identification and Characterization of a Novel Flagellum-Dependent *Salmonella*-Infecting Bacteriophage, iEPS5

Younho Choi, Hakdong Shin, Ju-Hoon Lee, Sangryeol Ryu 4829–4837

Shiga Toxin 2-Encoding Bacteriophages in Human Fecal Samples from Healthy Individuals

Alexandre Martinez-Castillo, Pablo Quirós, Ferran Navarro, Elisenda Miró, Maite Muniesa 4862–4868

Whole-Genome Transcriptional Analysis of *Escherichia coli* during Heat Inactivation Processes Related to Industrial Cooking

A. Guernec, P. Robichaud-Rincon, L. Saucier 4940–4950

Oral Administration of Live Exopolysaccharide-Producing *Pediococcus parvulus*, but Not Purified Exopolysaccharide, Suppressed *Enterobacteriaceae* without Affecting Bacterial Diversity in Ceca of Mice

Cecilia Lindström, Jie Xu, Rickard Öste, Olle Holst, Göran Molin 5030–5037

## GENETICS AND MOLECULAR BIOLOGY

Development of a New Method for Detection and Identification of *Oenococcus oeni* Bacteriophages Based on Endolysin Gene Sequence and Randomly Amplified Polymorphic DNA

Francesca Doria, Chiara Napoli, Antonella Costantini, Graziella Berta, Juan-Carlos Saiz, Emilia Garcia-Moruno 4799–4805

Multilocus Genotype Analysis of *Escherichia coli* O157 Isolates from Australia and the United States Provides Evidence of Geographic Divergence

Glen E. Mellor, Thomas E. Besser, Margaret A. Davis, Brittany Beavis, WooKyung Jung, Helen V. Smith, Amy V. Jennison, Christine J. Doyle, P. Scott Chandry, Kari S. Gobius, Narelle Fegan 5050–5058

## INVERTEBRATE MICROBIOLOGY

Bacterial Cell Wall Synthesis Gene *uppP* Is Required for *Burkholderia* Colonization of the Stinkbug Gut

Jiyeun Kate Kim, Ho Jin Lee, Yoshitomo Kikuchi, Wataru Kitagawa, Naruo Nikoh, Takema Fukatsu, Bok Luel Lee 4879–4886

<b>Diversity of Bacterial Endosymbionts Associated with <i>Macrostelus</i> Leafhoppers Vectoring Phytopathogenic Phytoplasmas</b>	Yoshiko Ishii, Yu Matsuura, Shigeyuki Kakizawa, Naruo Nikoh, Takema Fukatsu	5013–5022
<b>METHODS</b>		
<b>An Improved Method for <i>oriT</i>-Directed Cloning and Functionalization of Large Bacterial Genomic Regions</b>	Brian H. Kvitko, Ian A. McMillan, Herbert P. Schweizer	4869–4878
<b>Isolation of Optically Targeted Single Bacteria by Application of Fluidic Force Microscopy to Aerobic Anoxygenic Phototrophs from the Phyllosphere</b>	Philipp Stiefel, Tomaso Zambelli, Julia A. Vorholt	4895–4905
<b>Strain/Species-Specific Probe Design for Microbial Identification Microarrays</b>	Qichao Tu, Zhili He, Ye Deng, Jizhong Zhou	5085–5088
<b>MICROBIAL ECOLOGY</b>		
<b>The Microcosm Mediates the Persistence of Shiga Toxin-Producing <i>Escherichia coli</i> in Freshwater Ecosystems</b>	Steven A. Mauro, Hannah Opalko, Kyle Lindsay, Michael P. Colon, Gerald B. Koudelka	4821–4828
<b>Induction of Biofilm Formation in the Betaproteobacterium <i>Burkholderia unamae</i> CK43B Exposed to Exogenous Indole and Gallic Acid</b>	Dongyeop Kim, Irnayuli R. Sitepu, Yasuyuki Hashidoko	4845–4852
<b>Dry/Wet Cycles Change the Activity and Population Dynamics of Methanotrophs in Rice Field Soil</b>	Ke Ma, Ralf Conrad, Yahai Lu	4932–4939
<b>Aquacultured Rainbow Trout (<i>Oncorhynchus mykiss</i>) Possess a Large Core Intestinal Microbiota That Is Resistant to Variation in Diet and Rearing Density</b>	Sandi Wong, Thomas Waldrop, Steven Summerfelt, John Davidson, Frederic Barrows, P. Brett Kenney, Timothy Welch, Gregory D. Wiens, Kevin Snekvik, John F. Rawls, Christopher Good	4974–4984
<b>Proteome of the Nematode-Trapping Cells of the Fungus <i>Monacrosporium haptotylum</i></b>	Karl-Magnus Andersson, Tejashwari Meerupati, Fredrik Levander, Eva Friman, Dag Åhrén, Anders Tunlid	4993–5004
<b>MYCOLOGY</b>		
<b>Inhibition of <i>Aspergillus niger</i> Phosphate Solubilization by Fluoride Released from Rock Phosphate</b>	Gilberto de Oliveira Mendes, Nikolay Bojkov Vassilev, Victor Hugo Araújo Bonduki, Ivo Ribeiro da Silva, José Ivo Ribeiro, Jr., Maurício Dutra Costa	4906–4913
<b>PUBLIC HEALTH MICROBIOLOGY</b>		
<b>Longitudinal Monitoring of Extended-Spectrum-Beta-Lactamase/AmpC-Producing <i>Escherichia coli</i> at German Broiler Chicken Fattening Farms</b>	H. Laube, A. Friese, C. von Salviati, B. Guerra, A. Käsbohrer, L. Kreienbrock, U. Roesler	4815–4820
<b>Strain-Dependent Augmentation of Tight-Junction Barrier Function in Human Primary Epidermal Keratinocytes by <i>Lactobacillus</i> and <i>Bifidobacterium</i> Lysates</b>	Reshma Sultana, Andrew J. McBain, Catherine A. O'Neill	4887–4894
<b>Adherence to and Invasion of Human Intestinal Cells by <i>Arcobacter</i> Species and Their Virulence Genotypes</b>	Arturo Levican, Aldukali Alkeskas, Claudia Günter, Stephen J. Forsythe, María José Figueras	4951–4957

*Cover photograph* (Copyright © 2013, American Society for Microbiology. All Rights Reserved): Confocal laser scanning microscopy of iron-rich aggregates (“iron snow”) collected in the central basin of the acidic lignite mine Lake 77 in Brandenburg, Germany. The data set was deconvolved (with Huygens software) and shown as an isosurface projection (using Imaris software). Shown are reflection signals of what are likely iron(III) mineral particles (white), nucleic acid-stained bacteria of different morphologies (green), and autofluorescence of phototrophic organisms (blue). Photo by Thomas R. Neu. (See related article in July 2013, vol. 79, no. 14, p. 4272.)

## TABLE OF CONTENTS

### SPOTLIGHT

Articles of Significant Interest Selected from This Issue by the Editors	5093
--	------

### BIODEGRADATION

Assessment of Anaerobic Toluene Biodegradation Activity by <i>bssA</i> Transcript/Gene Ratios	Christina N. Brow, Reid O'Brien Johnson, Richard L. Johnson, Holly M. Simon	5338–5344
---	---	-----------

### BIOTECHNOLOGY

Saccharification of Cellulose by Recombinant <i>Rhodococcus opacus</i> PD630 Strains	Stephan Hetzler, Daniel Bröker, Alexander Steinbüchel	5159–5166
--	---	-----------

Tracking Down Biotransformation to the Genetic Level: Identification of a Highly Flexible Glycosyltransferase from <i>Saccharothrix espanaensis</i>	Tina Strobel, Yvonne Schmidt, Anton Linnenbrink, Andriy Luzhetskyy, Marta Luzhetskya, Takaaki Taguchi, Elke Brötz, Thomas Paululat, Maryna Stasevych, Oleg Stanko, Volodymyr Novikov, Andreas Bechthold	5224–5232
---	---	-----------

Genetic Determinants for <i>n</i> -Butanol Tolerance in Evolved <i>Escherichia coli</i> Mutants: Cross Adaptation and Antagonistic Pleiotropy between <i>n</i> -Butanol and Other Stressors	Luis H. Reyes, Ali S. Abdelaal, Katy C. Kao	5313–5320
---	---	-----------

Functional Characterization of Key Enzymes Involved in L-Glutamate Synthesis and Degradation in the Thermotolerant and Methylophilic Bacterium <i>Bacillus methanolicus</i>	Anne Krog, Tonje Marita Bjerkan Heggset, Trond Erling Ellingsen, Trygve Brautaset	5321–5328
---	---	-----------

Fermentation Temperature Modulates Phosphatidylethanolamine and Phosphatidylinositol Levels in the Cell Membrane of <i>Saccharomyces cerevisiae</i>	Clark M. Henderson, Wade F. Zeno, Larry A. Lerno, Marjorie L. Longo, David E. Block	5345–5356
---	---	-----------

### ENVIRONMENTAL MICROBIOLOGY

Population Structure of <i>Salmonella enterica</i> Serovar 4,[5], 12:b:– Strains and Likely Sources of Human Infection	Anne Toboldt, Erhard Tietze, Reiner Helmuth, Ernst Junker, Angelika Fruth, Burkhard Malorny	5121–5129
--	---	-----------

Novel, Oxygen-Insensitive Group 5 [NiFe]-Hydrogenase in <i>Ralstonia eutropha</i>	Caspar Schäfer, Bärbel Friedrich, Oliver Lenz	5137–5145
---	---	-----------

Application of Denaturing High-Performance Liquid Chromatography for Monitoring Sulfate-Reducing Bacteria in Oil Fields	Outi Priha, Mari Nyssönen, Malin Bomberg, Arja Laitila, Jaakko Simell, Anu Kapanen, Riikka Juvonen	5186–5196
---	--	-----------

Establishment of a Simple <i>Lactobacillus plantarum</i> Cell Consortium for Cellulase-Xylanase Synergistic Interactions	Sarah Moraïs, Naama Shterzer, Inna Rozman Grinberg, Geir Mathiesen, Vincent G. H. Eijsink, Lars Axelsson, Raphael Lamed, Edward A. Bayer, Itzhak Mizrahi	5242–5249
--	--	-----------

Combined Genomics and Experimental Analyses of Respiratory Characteristics of <i>Shewanella putrefaciens</i> W3-18-1	Dongru Qiu, Hehong Wei, Qichao Tu, Yunfeng Yang, Ming Xie, Jingrong Chen, Mark H. Pinkerton, Jr., Yili Liang, Zhili He, Jizhong Zhou	5250–5257
--	--	-----------

HylA, an Alternative Hydrolase for Initiation of Catabolism of the Phenylurea Herbicide Linuron in <i>Variovorax</i> sp. Strains	K. Bers, I. Batisson, P. Proost, R. Wattiez, R. De Mot, D. Springael	5258–5263
--	--	-----------

Functional Gene Analysis of Freshwater Iron-Rich Floccs at Circumneutral pH and Isolation of a Stalk-Forming Microaerophilic Iron-Oxidizing Bacterium	Shingo Kato, Clara Chan, Takashi Itoh, Moriya Ohkuma	5283–5290
---	--	-----------

Continued on following page

<b>Rapid Identification of <i>Bacillus anthracis</i> Spores in Suspicious Powder Samples by Using Matrix-Assisted Laser Desorption Ionization–Time of Flight Mass Spectrometry (MALDI-TOF MS)</b>	Marius Dybwad, Anton L. van der Laaken, Janet Martha Blatny, Armand Paauw	5372–5383
<b>New Group in the <i>Leptospirillum</i> Clade: Cultivation-Independent Community Genomics, Proteomics, and Transcriptomics of the New Species “<i>Leptospirillum</i> Group IV UBA BS”</b>	Daniela S. Aliaga Goltsman, Mauna Dasari, Brian C. Thomas, Manesh B. Shah, Nathan C. VerBerkmoes, Robert L. Hettich, Jillian F. Banfield	5384–5393
<b>Rapid Detection of <i>Ceratocystis platani</i> Inoculum by Quantitative Real-Time PCR Assay</b>	Nicola Luchi, Luisa Ghelardini, Lassaad Belbahri, Marion Quartier, Alberto Santini	5394–5404
<b>Pleiotropic Effects of <i>GacA</i> on <i>Pseudomonas fluorescens</i> Pf0-1 <i>In Vitro</i> and in Soil</b>	Sarah C. Seaton, Mark W. Silby, Stuart B. Levy	5405–5410
<b>ENZYMOLGY AND PROTEIN ENGINEERING</b>		
<b>Haloarchaeal-Type <math>\beta</math>-Ketothiolases Involved in Poly(3-Hydroxybutyrate-co-3-Hydroxyvalerate) Synthesis in <i>Haloferax mediterranei</i></b>	Jing Hou, Bo Feng, Jing Han, Hailong Liu, Dahe Zhao, Jian Zhou, Hua Xiang	5104–5111
<b>FOOD MICROBIOLOGY</b>		
<b>Characterization of a Feruloyl Esterase from <i>Lactobacillus plantarum</i></b>	María Esteban-Torres, Inés Reverón, José Miguel Mancheño, Blanca de las Rivas, Rosario Muñoz	5130–5136
<b>Longitudinal Study of Distributions of Similar Antimicrobial-Resistant <i>Salmonella</i> Serovars in Pigs and Their Environment in Two Distinct Swine Production Systems</b>	Shivaramu Keelara, H. Morgan Scott, William M. Morrow, Wondwossen A. Gebreyes, Maria Correa, Rajesh Nayak, Rossina Stefanova, Siddhartha Thakur	5167–5178
<b>Structure-Activity Relationship of Synthetic Variants of the Milk-Derived Antimicrobial Peptide <math>\alpha_2</math>-Casein f(183–207)</b>	Avelino Alvarez-Ordóñez, Máire Begley, Tanya Clifford, Thérèse Deasy, Kiera Considine, Colin Hill	5179–5185
<b>Facility-Specific “House” Microbiome Drives Microbial Landscapes of Artisan Cheesemaking Plants</b>	Nicholas A. Bokulich, David A. Mills	5214–5223
<b>GENETICS AND MOLECULAR BIOLOGY</b>		
<b>Adjustment of Trehalose Metabolism in Wine <i>Saccharomyces cerevisiae</i> Strains To Modify Ethanol Yields</b>	D. Rossouw, E. H. Heyns, M. E. Setati, S. Bosch, F. F. Bauer	5197–5207
<b>INVERTEBRATE MICROBIOLOGY</b>		
<b>Increases in the Amounts of <i>Vibrio</i> spp. in Oysters upon Addition of Exogenous Bacteria</b>	Brett Froelich, James Oliver	5208–5213
<b>METHODS</b>		
<b>Development of a Dual-Index Sequencing Strategy and Curation Pipeline for Analyzing Amplicon Sequence Data on the MiSeq Illumina Sequencing Platform</b>	James J. Kozich, Sarah L. Westcott, Nielson T. Baxter, Sarah K. Highlander, Patrick D. Schloss	5112–5120
<b>Polysaccharide-Degrading Thermophiles Generated by Heterologous Gene Expression in <i>Geobacillus kaustophilus</i> HTA426</b>	Hirokazu Suzuki, Ken-ichi Yoshida, Toshihisa Ohshima	5151–5158
<b>Exploring Environmental Control of Cyclic di-GMP Signaling in <i>Vibrio cholerae</i> by Using the <i>Ex Vivo</i> Lysate Cyclic di-GMP Assay (TELCA)</b>	Benjamin J. Koestler, Christopher M. Waters	5233–5241
<b>Measurement of Predation and Biofilm Formation under Different Ambient Oxygen Conditions Using a Simple Gasbag-Based System</b>	Daniel E. Kadouri, Aimy Tran	5264–5271

**Quantification of Endospore-Forming *Firmicutes* by Quantitative PCR with the Functional Gene *spo0A***

Matthieu Bueche, Tina Wunderlin, Ludovic Roussel-Delif, Thomas Junier, Loic Sauvain, Nicole Jeanneret, Pilar Junier 5302–5312

**MICROBIAL ECOLOGY**

**Serotypes, Virulence Factors, and Antimicrobial Susceptibilities of Vaginal and Fecal Isolates of *Escherichia coli* from Giant Pandas**

Xin Wang, Qigui Yan, Xiaodong Xia, Yanming Zhang, Desheng Li, Chengdong Wang, Shijie Chen, Rong Hou 5146–5150

**Chitin Amendment Increases Soil Suppressiveness toward Plant Pathogens and Modulates the Actinobacterial and Oxalobacteraceal Communities in an Experimental Agricultural Field**

Mariana Silvia Cretoiu, Gerard W. Korthals, Johnny H. M. Visser, Jan Dirk van Elsas 5291–5301

**Indigenous Microbiota and Habitat Influence *Escherichia coli* Survival More than Sunlight in Simulated Aquatic Environments**

Asja Korajkic, Pauline Wanjugi, Valerie J. Harwood 5329–5337

**Disruption of Cell-to-Cell Signaling Does Not Abolish the Antagonism of *Phaeobacter gallaeciensis* toward the Fish Pathogen *Vibrio anguillarum* in Algal Systems**

M. J. Prol García, P. W. D'Alvise, L. Gram 5414–5417

**PLANT MICROBIOLOGY**

**Bacterially Induced Weathering of Ultramafic Rock and Its Implications for Phytoextraction**

Cristina Becerra-Castro, Petra Kidd, Melanie Kuffner, Ángeles Prieto-Fernández, Stephan Hann, Carmela Monterroso, Angela Sessitsch, Walter Wenzel, Markus Puschenreiter 5094–5103

**pA506, a Conjugative Plasmid of the Plant Epiphyte *Pseudomonas fluorescens* A506**

Virginia O. Stockwell, Edward W. Davis II, Alyssa Carey, Brenda T. Shaffer, Dmitri V. Mavrodi, Karl A. Hassan, Kevin Hockett, Linda S. Thomashow, Ian T. Paulsen, Joyce E. Loper 5272–5282

**PUBLIC HEALTH MICROBIOLOGY**

**Frequent Occurrence of Mixed *Enterocytozoon bienensei* Infections in Humans**

Giovanni Widmer, Julia Dilo, James K. Tumwine, Saul Tzipori, Donna E. Akiyoshi 5357–5362

**Host Association of *Cryptosporidium parvum* Populations Infecting Domestic Ruminants in Spain**

Joaquín Quilez, Claudia Vergara-Castiblanco, Luis Monteagudo, Emilio del Cacho, Caridad Sánchez-Acedo 5363–5371

**Detection of the Emerging Shiga Toxin-Producing *Escherichia coli* O26:H11/H<sup>-</sup> Sequence Type 29 (ST29) Clone in Human Patients and Healthy Cattle in Switzerland**

Claudio Zweifel, Nicole Cernela, Roger Stephan 5411–5413

**LETTER TO THE EDITOR**

**Ranking Filter Methods for Concentrating Pathogens in Lake Water**

Mark A. Borchardt, Burney A. Kieke, Jr., Susan K. Spencer 5418–5419

**Reply to “Ranking Filter Methods for Concentrating Pathogens in Lake Water”**

Rebecca N. Bushon, Donna S. Francy, Vicente J. Gallardo, H. D. Alan Lindquist, Eric N. Villegas, Michael W. Ware 5420–5421

## TABLE OF CONTENTS

### SPOTLIGHT

Articles of Significant Interest Selected from This Issue by the Editors

5423

### BIODEGRADATION

*ipso*-Hydroxylation and Subsequent Fragmentation: a Novel Microbial Strategy To Eliminate Sulfonamide Antibiotics

Benjamin Ricken, Philippe F. X. Corvini, Danuta Cichocka, Martina Parisi, Markus Lenz, Dominik Wyss, Paula M. Martínez-Lavanchy, Jochen A. Müller, Patrick Shahgaldian, Ludovico G. Tulli, Hans-Peter E. Kohler, Boris A. Kolvenbach 5550–5558

### BIOTECHNOLOGY

Deletion of *creB* in *Aspergillus oryzae* Increases Secreted Hydrolytic Enzyme Activity

A. J. Hunter, T. A. Morris, B. Jin, C. P. Saint, J. M. Kelly 5480–5487

Screening for Glycosylphosphatidylinositol-Modified Cell Wall Proteins in *Pichia pastoris* and Their Recombinant Expression on the Cell Surface

Li Zhang, Shuli Liang, Xinying Zhou, Zi Jin, Fengchun Jiang, Shuangyan Han, Suiping Zheng, Ying Lin 5519–5526

*Bacillus subtilis* Strain Engineered for Treatment of Soil-Transmitted Helminth Diseases

Yan Hu, Melanie M. Miller, Alan I. Derman, Brian L. Ellis, Rose Gomes Monnerat, Joe Pogliano, Raffi V. Aroian 5527–5532

Platform Engineering of *Corynebacterium glutamicum* with Reduced Pyruvate Dehydrogenase Complex Activity for Improved Production of L-Lysine, L-Valine, and 2-Ketoisovalerate

Jens Buchholz, Andreas Schwentner, Britta Brunnenkan, Christina Gabris, Simon Grimm, Robert Gerstmeir, Ralf Takors, Bernhard J. Eikmanns, Bastian Blombach 5566–5575

Generation of Affinity-Tagged Fluoromycobacteriophages by Mixed Assembly of Phage Capsids

Mariana Piuri, Liliana Rondón, Estefanía Urdániz, Graham F. Hatfull 5608–5615

### ENVIRONMENTAL MICROBIOLOGY

Relationship between Presence of Cows with Milk Positive for *Mycobacterium avium* subsp. *paratuberculosis*-Specific Antibody by Enzyme-Linked Immunosorbent Assay and Viable *M. avium* subsp. *paratuberculosis* in Dust in Cattle Barns

Susanne W. F. Eisenberg, Ruj Chuchaisangrat, Mirjam Nielen, Ad P. Koets 5458–5464

Diversity, Community Composition, and Dynamics of Nonpigmented and Late-Pigmenting Rapidly Growing Mycobacteria in an Urban Tap Water Production and Distribution System

S. Dubrou, J. Konjek, E. Macheras, B. Welté, L. Guidicelli, E. Chignon, M. Joyeux, J. L. Gaillard, B. Heym, T. Tully, G. Sapriel 5498–5508

Characterization of Maltocin P28, a Novel Phage Tail-Like Bacteriocin from *Stenotrophomonas maltophilia*

Jian Liu, Peng Chen, Congyi Zheng, Yu-Ping Huang 5593–5600

Differential Growth of and Nanoscale TiO<sub>2</sub> Accumulation in *Tetrahymena thermophila* by Direct Feeding versus Trophic Transfer from *Pseudomonas aeruginosa*

Randall E. Mielke, John H. Priester, Rebecca A. Werlin, Jeff Gelb, Allison M. Horst, Eduardo Orias, Patricia A. Holden 5616–5624

Biofilm Formation by the Fish Pathogen *Flavobacterium columnare*: Development and Parameters Affecting Surface Attachment

Wenlong Cai, Leonardo De La Fuente, Covadonga R. Arias 5633–5642

Identification and Characterization of a NaCl-Responsive Genetic Locus Involved in Survival during Desiccation in *Sinorhizobium meliloti*

Jan A. C. Vriezen, Frans J. de Bruijn, Klaus Nüsslein 5693–5700

Utilization of Heme as an Iron Source by Marine *Alphaproteobacteria* in the *Roseobacter* Clade

Kelly L. Roe, Shane L. Hogle, Katherine A. Barbeau 5753–5762

Distribution of Virulence Genes in Clinical and Environmental *Vibrio cholerae* Strains in Bangladesh

Nur A. Hasan, Daniela Ceccarelli, Christopher J. Grim, Elisa Taviani, Jinna Choi, Abdus Sadique, Munirul Alam, Abul K. Siddique, R. Bradley Sack, Anwar Huq, Rita R. Colwell 5782–5785

## ENZYMOLGY AND PROTEIN ENGINEERING

Structure-Function Relationships in Hydrophobins: Probing the Role of Charged Side Chains

Michael Lienemann, Julie-Anne Gandier, Jussi J. Joensuu, Atsushi Iwanaga, Yoshiyuki Takatsuji, Tetsuya Haruyama, Emma Master, Maija Tenkanen, Markus B. Linder 5533–5538

Proteolysin, a Novel Highly Thermostable and Cosolvent-Compatible Protease from the Thermophilic Bacterium *Coprothermobacter proteolyticus*

Ana Toplak, Bian Wu, Fabrizia Fusetti, Peter J. L. M. Quaedflieg, Dick B. Janssen 5625–5632

## FOOD MICROBIOLOGY

Evidence of Metabolic Switching and Implications for Food Safety from the Phenome(s) of *Salmonella enterica* Serovar Typhimurium DT104 Cultured at Selected Points across the Pork Production Food Chain

Marta Martins, Matthew P. McCusker, Evonne M. McCabe, Denis O'Leary, Geraldine Duffy, Séamus Fanning 5437–5449

*prfA*-Like Transcription Factor Gene *lmo0753* Contributes to L-Rhamnose Utilization in *Listeria monocytogenes* Strains Associated with Human Food-Borne Infections

Joelle K. Salazar, Zhuchun Wu, P. David McMullen, Qin Luo, Nancy E. Freitag, Mary Lou Tortorello, Shencai Hu, Wei Zhang 5584–5592

Abiotic and Microbiotic Factors Controlling Biofilm Formation by Thermophilic Sporeformers

Yu Zhao, Martien P. M. Caspers, Karin I. Metselaar, Paulo de Boer, Guus Roeselers, Roy Moezelaar, Masja Nierop Groot, Roy C. Montijn, Tjakko Abee, Remco Kort 5652–5660

Core Fluxome and Metafluxome of Lactic Acid Bacteria under Simulated Cocoa Pulp Fermentation Conditions

Philipp Adler, Christoph Josef Bolten, Katrin Dohnt, Carl Erik Hansen, Christoph Wittmann 5670–5681

Nisin Resistance of *Listeria monocytogenes* Is Increased by Exposure to Salt Stress and Is Mediated via LiaR

Teresa M. Bergholz, Silin Tang, Martin Wiedmann, Kathryn J. Boor 5682–5688

Impact of Manure Fertilization on the Abundance of Antibiotic-Resistant Bacteria and Frequency of Detection of Antibiotic Resistance Genes in Soil and on Vegetables at Harvest

Romain Marti, Andrew Scott, Yuan-Ching Tien, Roger Murray, Lyne Sabourin, Yun Zhang, Edward Topp 5701–5709

## GENETICS AND MOLECULAR BIOLOGY

Augmenting the Genetic Toolbox for *Sulfolobus islandicus* with a Stringent Positive Selectable Marker for Agmatine Prototrophy

Changyi Zhang, Tara E. Cooper, David J. Krause, Rachel J. Whitaker 5539–5549

The Evolutionary Divergence of Shiga Toxin-Producing *Escherichia coli* Is Reflected in Clustered Regularly Interspaced Short Palindromic Repeat (CRISPR) Spacer Composition

Shuang Yin, Mark A. Jensen, Jiawei Bai, Chitrita DebRoy, Rodolphe Barrangou, Edward G. Dudley 5710–5720

Interaction of *Lactobacillus fermentum* BGHI14 with Rat Colonic Mucosa: Implications for Colitis Induction

Jovanka Lukic, Ivana Strahinic, Marina Milenkovic, Natasa Golic, Milan Kojic, Ljubisa Topisirovic, Jelena Begovic 5735–5744

A Novel *Bacillus thuringiensis* Cry-Like Protein from a Rare Filamentous Strain Promotes Crystal Localization within the Exosporium

David R. Ammons, Antonio Reyna, Jose C. Granados, Antonio Ventura-Suárez, Luz I. Rojas-Avelizapa, John D. Short, Joanne N. Rampersad 5774–5776

## INVERTEBRATE MICROBIOLOGY

A *Spodoptera exigua* Cadherin Serves as a Putative Receptor for *Bacillus thuringiensis* Cry1Ca Toxin and Shows Differential Enhancement of Cry1Ca and Cry1Ac Toxicity

Xiang-Liang Ren, Rui-Rui Chen, Ying Zhang, Yan Ma, Jin-Jie Cui, Zhao-Jun Han, Li-Li Mu, Guo-Qing Li 5576–5583

## METHODS

Direct Assessment of Viral Diversity in Soils by Random PCR Amplification of Polymorphic DNA

Sharath Srinivasiah, Jacqueline Lovett, Shawn Polson, Jaysheel Bhavsar, Dhritiman Ghosh, Krishnakali Roy, Jeffrey J. Fuhrmann, Mark Radosevich, K. Eric Wommack 5450–5457

Live-Cell Imaging Tool Optimization To Study Gene Expression Levels and Dynamics in Single Cells of *Bacillus cereus*

Robyn T. Eijlander, Oscar P. Kuipers 5643–5651

## MICROBIAL ECOLOGY

Psychrophilic and Psychrotolerant Fungi on Bats and the Presence of *Geomyces* spp. on Bat Wings Prior to the Arrival of White Nose Syndrome

Lynnaun J. A. N. Johnson, Andrew N. Miller, Robert A. McCleery, Rod McClanahan, Joseph A. Kath, Shiloh Lueschow, Andrea Porras-Alfaro 5465–5471

Duodenal-Mucosal Bacteria Associated with Celiac Disease in Children

Ester Sánchez, Ester Donat, Carmen Ribes-Koninckx, Maria Leonor Fernández-Murga, Yolanda Sanz 5472–5479

T4-Like Phage Bp7, a Potential Antimicrobial Agent for Controlling Drug-Resistant *Escherichia coli* in Chickens

Can Zhang, Wenli Li, Wenhua Liu, Ling Zou, Chen Yan, Kai Lu, Huiying Ren 5559–5565

Whole-Transcriptome Shotgun Sequencing (RNA-seq) Screen Reveals Upregulation of Cellobiose and Motility Operons of *Lactobacillus ruminis* L5 during Growth on Tetrasaccharides Derived from Barley  $\beta$ -Glucan

Blair Lawley, Ian M. Sims, Gerald W. Tannock 5661–5669

Diet Complexity and Estrogen Receptor  $\beta$  Status Affect the Composition of the Murine Intestinal Microbiota

Rani Menon, Sara E. Watson, Laura N. Thomas, Clinton D. Allred, Alan Dabney, M. Andrea Azcarate-Peril, Joseph M. Sturino 5763–5773

Assimilation of Cellulose-Derived Carbon by Microeukaryotes in Oxidic and Anoxic Slurries of an Aerated Soil

Antonis Chatzinotas, Stefanie Schellenberger, Karin Glaser, Steffen Kolb 5777–5781

## PHYSIOLOGY

Malic Enzyme and Malolactic Enzyme Pathways Are Functionally Linked but Independently Regulated in *Lactobacillus casei* BL23

José María Landete, Sergi Ferrer, Vicente Monedero, Manuel Zúñiga 5509–5518

## PLANT MICROBIOLOGY

Discovery of Plant Phenolic Compounds That Act as Type III Secretion System Inhibitors or Inducers of the Fire Blight Pathogen, *Erwinia amylovora*

Devanshi Khokhani, Chengfang Zhang, Yan Li, Qi Wang, Quan Zeng, Akihiro Yamazaki, William Hutchins, Shan-Shan Zhou, Xin Chen, Ching-Hong Yang 5424–5436

New Type of Antimicrobial Protein Produced by the Plant Pathogen *Clavibacter michiganensis* subsp. *michiganensis*

Zhanliang Liu, Ping Ma, Ingrid Holtsmark, Morten Skaugen, Vincent G. H. Eijssink, May B. Brurberg 5721–5727

**LuxR- and LuxI-Type Quorum-Sensing Circuits Are Prevalent in Members of the *Populus deltoides* Microbiome**

Amy L. Schaefer, Colin R. Lappala, 5745–5752  
Ryan P. Morlen, Dale A. Pelletier,  
Tse-Yuan S. Lu, Patricia K. Lankford,  
Caroline S. Harwood, E. Peter  
Greenberg

**PUBLIC HEALTH MICROBIOLOGY**

**Widespread Occurrence of Bacterial Human Virulence Determinants in Soil and Freshwater Environments**

Ditte A. Søborg, Niels Bohse 5488–5497  
Hendriksen, Mogens Kilian, Niels  
Kroer

**Shared *Mycobacterium avium* Genotypes Observed among Unlinked Clinical and Environmental Isolates**

M. Ashworth Dirac, Kris M. Weigel, 5601–5607  
Mitchell A. Yakrus, Annie L. Becker,  
Hui-Ling Chen, Gina Fridley, Arthur  
Sikora, Cate Speake, Elizabeth D.  
Hilborn, Stacy Pfaller, Gerard A.  
Cangelosi

**Prevalence of Gastrointestinal *Clostridium difficile* Carriage in Australian Sheep and Lambs**

Daniel R. Knight, Thomas V. Riley 5689–5692

**Transfer Efficiency of Bacteria and Viruses from Porous and Nonporous Fomites to Fingers under Different Relative Humidity Conditions**

Gerardo U. Lopez, Charles P. Gerba, 5728–5734  
Akrum H. Tamimi, Masaaki Kitajima,  
Sheri L. Maxwell, Joan B. Rose

## TABLE OF CONTENTS

### SPOTLIGHT

Articles of Significant Interest Selected from This Issue by the Editors

5787

### BIODEGRADATION

Enantioselective Dehydrochlorination of  $\delta$ -Hexachlorocyclohexane and  $\delta$ -Pentachlorocyclohexene by LinA1 and LinA2 from *Sphingobium indicum* B90A

Birgit Geueke, Milena E. Miska, Thomas Poiger, Daniel Rentsch, Rup Lal, Christof Holliger, Hans-Peter E. Kohler

6180–6183

### BIOTECHNOLOGY

Characterization of AmiBA2446, a Novel Bacteriolytic Enzyme Active against *Bacillus* Species

Krunal K. Mehta, Elena E. Paskaleva, Saba Azizi-Ghannad, Daniel J. L y, Martin A. Page, Jonathan S. Dordick, Ravi S. Kane

5899–5906

Transcriptome-Based Characterization of Interactions between *Saccharomyces cerevisiae* and *Lactobacillus delbrueckii* subsp. *bulgaricus* in Lactose-Grown Chemostat Cocultures

Filipa Mendes, Sander Sieuwerts, Erik de Hulster, Marinka J. H. Almering, Marijke A. H. Luttik, Jack T. Pronk, Eddy J. Smid, Peter A. Bron, Pascale Daran-Lapujade

5949–5961

Construction of a Prophage-Free Variant of *Corynebacterium glutamicum* ATCC 13032 for Use as a Platform Strain for Basic Research and Industrial Biotechnology

Meike Baumgart, Simon Unthan, Christian R ckert, Jasinth Sivalingam, Alexander Gr nberger, J rn Kalinowski, Michael Bott, Stephan Noack, Julia Frunzke

6006–6015

Reconstitution of Active Mycobacterial Binuclear Iron Monooxygenase Complex in *Escherichia coli*

Toshiki Furuya, Mika Hayashi, Kuniki Kino

6033–6039

Investigation of Malic Acid Production in *Aspergillus oryzae* under Nitrogen Starvation Conditions

Christoph Knuf, Intawat Nookaew, Stephen H. Brown, Michael McCulloch, Alan Berry, Jens Nielsen

6050–6058

Rapid Aggregation of Biofuel-Producing Algae by the Bacterium *Bacillus* sp. Strain RP1137

Ryan J. Powell, Russell T. Hill

6093–6101

Engineered Biosynthesis of Disaccharide-Modified Polyene Macrolides

Eimear De Poire, Niamh Stephens, Bernard Rawlings, Patrick Caffrey

6156–6159

### ENVIRONMENTAL MICROBIOLOGY

Experimental Transmission of Infectious Pancreatic Necrosis Virus from the Blue Mussel, *Mytilus edulis*, to Cohabiting Atlantic Salmon (*Salmo salar*) Smolts

Sally D. Molloy, Michael R. Pietrak, Ian Bricknell, Deborah A. Bouchard

5882–5890

Detoxification of Mercury by Methanobactin from *Methylosinus trichosporium* OB3b

Alexey Vorobev, Sheeja Jagadevan, Bipin S. Baral, Alan A. DiSpirito, Brittani C. Freemeier, Brandt H. Bergman, Nathan L. Bandow, Jeremy D. Semrau

5918–5926

Application of Variable-Number Tandem-Repeat Typing To Discriminate *Ralstonia solanacearum* Strains Associated with English Watercourses and Disease Outbreaks

Neil Parkinson, Ruth Bryant, Janice Bew, Christine Conyers, Robert Stones, Michael Alcock, John Elphinstone

6016–6022

Extending the Cellulosome Paradigm: the Modular *Clostridium thermocellum* Cellulosomal Serpin PinA Is a Broad-Spectrum Inhibitor of Subtilisin-Like Proteases

P raic   Cuiv, Rajesh Gupta, Hareshwar P. Goswami, Mark Morrison

6173–6175



Antimicrobial Resistance in Indicator *Escherichia coli* Isolates from Free-Ranging Livestock and Sympatric Wild Ungulates in a Natural Environment (Northeastern Spain)

N. Navarro-Gonzalez, M. C. Porrero, G. Mentaberre, E. Serrano, A. Mateos, L. Domínguez, S. Lavín 6184–6186

## ENZYMOLGY AND PROTEIN ENGINEERING

Identification and Characterization of a *Mucilaginibacter* sp. Strain QM49  $\beta$ -Glucosidase and Its Use in the Production of the Pharmaceutically Active Minor Ginsenosides (S)-Rh<sub>1</sub> and (S)-Rg<sub>2</sub>

Chang-Hao Cui, Qing-Mei Liu, Jin-Kwang Kim, Bong-Hyun Sung, Song-Gun Kim, Sun-Chang Kim, Wan-Taek Im 5788–5798

Unique Contribution of the Cell Wall-Binding Endoglucanase G to the Cellulolytic Complex in *Clostridium cellulovorans*

Sang Duck Jeon, Ji Eun Lee, Su Jung Kim, Sung Hyun Park, Gi-Wook Choi, Sung Ok Han 5942–5948

Directed Evolution and Structural Analysis of NADPH-Dependent Acetoacetyl Coenzyme A (Acetoacetyl-CoA) Reductase from *Ralstonia eutropha* Reveals Two Mutations Responsible for Enhanced Kinetics

Ken'ichiro Matsumoto, Yoshikazu Tanaka, Tsuyoshi Watanabe, Ren Motohashi, Koji Ikeda, Kota Tobitani, Min Yao, Isao Tanaka, Seiichi Taguchi 6134–6139

## EVOLUTIONARY AND GENOMIC MICROBIOLOGY

Variation of the Virus-Related Elements within Syntenic Genomes of the Hyperthermophilic Archaeon *Aeropyrum*

Takashi Daifuku, Takashi Yoshida, Takayuki Kitamura, Satoshi Kawaichi, Takahiro Inoue, Keigo Nomura, Yui Yoshida, Sotaro Kuno, Yoshihiko Sako 5891–5898

## FOOD MICROBIOLOGY

The Carbohydrate Metabolism Signature of *Lactococcus lactis* Strain A12 Reveals Its Sourdough Ecosystem Origin

Delphine Passerini, Michèle Coddeville, Pascal Le Bourgeois, Pascal Loubière, Paul Ritzenthaler, Catherine Fontagné-Faucher, Marie-Line Daveran-Mingot, Muriel Cocaïgn-Bousquet 5844–5852

Combining Individual-Based Modeling and Food Microenvironment Descriptions To Predict the Growth of *Listeria monocytogenes* on Smear Soft Cheese

Rachel Ferrier, Bernard Hezard, Adrienne Lintz, Valérie Stahl, Jean-Christophe Augustin 5870–5881

Alternative Sigma Factor  $\sigma^E$  Has an Important Role in Stress Tolerance of *Yersinia pseudotuberculosis* IP32953

Eveliina Palonen, Miia Lindström, Panu Somervuo, Hannu Korkeala 5970–5977

*FLO11* Gene Is Involved in the Interaction of Flor Strains of *Saccharomyces cerevisiae* with a Biofilm-Promoting Synthetic Hexapeptide

Marc Bou Zeidan, Lourdes Carmona, Severino Zara, Jose F. Marcos 6023–6032

An Extracellular Serine/Threonine-Rich Protein from *Lactobacillus plantarum* NCIMB 8826 Is a Novel Aggregation-Promoting Factor with Affinity to Mucin

Arancha Hevia, Noelia Martínez, Víctor Ladero, Miguel A. Álvarez, Abelardo Margolles, Borja Sánchez 6059–6066

Conservation and Distribution of the Benzalkonium Chloride Resistance Cassette *bcrABC* in *Listeria monocytogenes*

Vikrant Dutta, Driss Elhanafi, Sophia Kathariou 6067–6074

Comparison of *Listeria monocytogenes* Exoproteomes from Biofilm and Planktonic State: Lmo2504, a Protein Associated with Biofilms

António Lourenço, Aitor de Las Heras, Mariela Scortti, Jose Vazquez-Boland, Joseph F. Frank, Luisa Brito 6075–6082

## GENETICS AND MOLECULAR BIOLOGY

Characterization of the *Burkholderia thailandensis* SOS Response by Using Whole-Transcriptome Shotgun Sequencing

Ricky L. Ulrich, David DeShazer, Tara A. Kenny, Melanie P. Ulrich, Anna Moravusova, Timothy Opperman, Sina Bavari, Terry L. Bowlin, Donald T. Moir, Rekha G. Panchal 5830–5843

Distinct Amino Acids of Histone H3 Control Secondary Metabolism in *Aspergillus nidulans*

Hans-Wilhelm Nützmann, Juliane Fischer, Kirstin Scherlach, Christian Hertweck, Axel A. Brakhage 6102–6109

The Virulence of *Salmonella enterica* Serovar Typhimurium in the Insect Model *Galleria mellonella* Is Impaired by Mutations in RNase E and RNase III

Sandra C. Viegas, Dalila Mil-Homens, Arsênio M. Fialho, Cecília M. Arraiano 6124–6133

The Peptidoglycan Hydrolase of *Staphylococcus aureus* Bacteriophage  $\phi$ 11 Plays a Structural Role in the Viral Particle

Lorena Rodríguez-Rubio, Nuria Quiles-Puchalt, Beatriz Martínez, Ana Rodríguez, José R. Penadés, Pilar García 6187–6190

## INVERTEBRATE MICROBIOLOGY

Shared Metabolic Pathways in a Coevolved Insect-Bacterial Symbiosis

Calum W. Russell, Sophie Bouvaine, Peter D. Newell, Angela E. Douglas 6117–6123

## METHODS

New Methods for Analysis of Spatial Distribution and Coaggregation of Microbial Populations in Complex Biofilms

Robert Almstrand, Holger Daims, Frank Persson, Fred Sörensson, Malte Hermansson 5978–5987

## MICROBIAL ECOLOGY

Adhesion of Human and Animal *Escherichia coli* Strains in Association with Their Virulence-Associated Genes and Phylogenetic Origins

Ulrike Frömmel, Werner Lehmann, Stefan Rödiger, Alexander Böhm, Jörg Nitschke, Jörg Weinreich, Julia Groß, Dirk Roggenbuck, Olaf Zinke, Hermann Ansorge, Steffen Vogel, Per Klemm, Thomas Wex, Christian Schröder, Lothar H. Wieler, Peter Schierack 5814–5829

Bacterial Community Response to Petroleum Hydrocarbon Amendments in Freshwater, Marine, and Hypersaline Water-Containing Microcosms

Diogo Jurelevicius, Vanessa Marques Alvarez, Joana Montezano Marques, Laryssa Ribeiro Fonseca de Sousa Lima, Felipe de Almeida Dias, Lucy Seldin 5927–5935

Abundant DNase I-Sensitive Bacterial DNA in Healthy Porcine Lungs and Its Implications for the Lung Microbiome

Alejandro A. Pezzulo, Patrick H. Kelly, Boulos S. Nassar, Cedric J. Rutland, Nicholas D. Gansemer, Cassie L. Dohrn, Andrew J. Costello, David A. Stoltz, Joseph Zabner 5936–5941

Intragenomic Heterogeneity of 16S rRNA Genes Causes Overestimation of Prokaryotic Diversity

Dong-Lei Sun, Xuan Jiang, Qinglong L. Wu, Ning-Yi Zhou 5962–5969

Multilocus Sequence Typing Reveals Evidence of Homologous Recombination Linked to Antibiotic Resistance in the Genus *Salinispora*

Kelle C. Freel, Natalie Millán-Aguiñaga, Paul R. Jensen 5997–6005

Variation in Consumption of Human Milk Oligosaccharides by Infant Gut-Associated Strains of *Bifidobacterium breve*

Santiago Ruiz-Moyano, Sarah M. Totten, Daniel A. Garrido, Jennifer T. Smilowitz, J. Bruce German, Carlito B. Lebrilla, David A. Mills 6040–6049

Broad Distribution of Diverse Anaerobic Ammonium-Oxidizing Bacteria in Chinese Agricultural Soils

Li-dong Shen, Shuai Liu, Li-ping Lou, Wei-ping Liu, Xiang-yang Xu, Ping Zheng, Bao-lan Hu 6167–6172

## MYCOLOGY

Characterization of *Pleurotus ostreatus* Biofilms by Using the Calgary Biofilm Device

Lorena Pesciaroli, Maurizio Petruccioli, Stefano Fedi, Andrea Firrincieli, Federico Federici, Alessandro D'Annibale 6083–6092

## PHYSIOLOGY

- Development of a Gene Knockout System Using Mobile Group II Introns (Targetron) and Genetic Disruption of Acid Production Pathways in *Clostridium beijerinckii* 5853–5863  
Yi Wang, Xiangzhen Li, Caroline B. Milne, Holger Janssen, Weiyin Lin, Gloria Phan, Huiying Hu, Yong-Su Jin, Nathan D. Price, Hans P. Blaschek
- Comparative Proteomic Analysis of *Streptomyces lividans* Wild-Type and *ppk* Mutant Strains Reveals the Importance of Storage Lipids for Antibiotic Biosynthesis 5907–5917  
Pierre Le Maréchal, Paulette Decottignies, Christophe H. Marchand, Jeril Degrouard, Danièle Jaillard, Thierry Dulermo, Marine Froissard, Aleksey Smirnov, Violaine Chapuis, Marie-Joelle Virolle
- Evolution of *Pseudomonas aeruginosa* Virulence as a Result of Phage Predation 6110–6116  
Zeinab Hosseinidoust, Theo G. M. van de Ven, Nathalie Tufenkji
- Oxidative Stress at High Temperatures in *Lactococcus lactis* Due to an Insufficient Supply of Riboflavin 6140–6147  
Jun Chen, Jing Shen, Christian Solem, Peter Ruhdal Jensen
- Novel Tripartite Aromatic Acid Transporter Essential for Terephthalate Uptake in *Comamonas* sp. Strain E6 6148–6155  
Masaru Hosaka, Naofumi Kamimura, Shotaro Toribami, Kosuke Mori, Daisuke Kasai, Masao Fukuda, Eiji Masai
- Clostridium acidurici* Electron-Bifurcating Formate Dehydrogenase 6176–6179  
Shuning Wang, Haiyan Huang, Jörg Kahnt, Rudolf K. Thauer
- Rhodococcus jostii* Porin A (RjpA) Functions in Cholate Uptake 6191–6193  
Vijayakumar Somalinga, William W. Mohn

## PUBLIC HEALTH MICROBIOLOGY

- Occurrence of Waterborne Pathogens and *Escherichia coli* at Offshore Drinking Water Intakes in Lake Ontario 5799–5813  
T. A. Edge, I. U. H. Khan, R. Bouchard, J. Guo, S. Hill, A. Locas, L. Moore, N. Neumann, E. Nowak, P. Payment, R. Yang, R. Yerubandi, S. Watson
- Genetic Characterization of Atypical Enteropathogenic *Escherichia coli* Isolates from Ewes' Milk, Sheep Farm Environments, and Humans by Multilocus Sequence Typing and Pulsed-Field Gel Electrophoresis 5864–5869  
Verónica Otero, José-María Rodríguez-Calleja, Andrés Otero, María-Luisa García-López, Jesús A. Santos
- Molecular Typing of CTX-M-Producing *Escherichia coli* Isolates from Environmental Water, Swine Feces, Specimens from Healthy Humans, and Human Patients 5988–5996  
Yan-Yan Hu, Jia-Chang Cai, Hong-Wei Zhou, Dan Chi, Xiao-Fei Zhang, Wei-Liang Chen, Rong Zhang, Gong-Xiang Chen
- Pyrosequence Analysis of the *hsp65* Genes of Nontuberculous *Mycobacterium* Communities in Unchlorinated Drinking Water in the Netherlands 6160–6166  
Paul W. J. J. van der Wielen, Leo Heijnen, Dick van der Kooij

## TABLE OF CONTENTS

### SPOTLIGHT

Articles of Significant Interest Selected from This Issue by the Editors

### BIODEGRADATION

Carbonylation as a Key Reaction in Anaerobic Acetone Activation by *Desulfococcus biacutus*

Olga B. Gutiérrez Acosta, Norman Hardt, Bernhard Schink 6195

### BIOTECHNOLOGY

Metagenome Survey of a Multispecies and Alga-Associated Biofilm Revealed Key Elements of Bacterial-Algal Interactions in Photobioreactors

Ines Krohn-Molt, Bernd Wemheuer, Malik Alawi, Anja Poehlein, Simon Güllert, Christel Schmeisser, Andreas Pommerening-Röser, Adam Grundhoff, Rolf Daniel, Dieter Hanelt, Wolfgang R. Streit 6196–6206

CtpB1 Overproduction in *Synechocystis* sp. Strain PCC 6803 Increases Tolerance to Rapid Heat Shock

C. Raul Gonzalez-Esquer, Wim F. J. Vermaas 6220–6227

The Periplasmic HrpB1 Protein from *Xanthomonas* spp. Binds to Peptidoglycan and to Components of the Type III Secretion System

Jens Hausner, Nadine Hartmann, Christian Lorenz, Daniela Büttner 6312–6324

### ENVIRONMENTAL MICROBIOLOGY

Coherence among Different Microbial Source Tracking Markers in a Small Agricultural Stream with or without Livestock Exclusion Practices

Graham Wilkes, Julie Brassard, Thomas A. Edge, Victor Gannon, Cassandra C. Jokinen, Tineke H. Jones, Romain Marti, Norman F. Neumann, Norma J. Ruecker, Mark Sunohara, Edward Topp, David R. Lapen 6207–6219

Genetically Diverse *Clostridium difficile* Strains Harboring Abundant Prophages in an Estuarine Environment

K. R. Hargreaves, H. V. Colvin, K. V. Patel, J. J. P. Clokie, M. R. J. Clokie 6236–6243

Strong Seasonality and Interannual Recurrence in Marine Myovirus Communities

A. Pagarete, C.-E. T. Chow, T. Johannessen, J. A. Fuhrman, T. F. Thingstad, R. A. Sandaa 6253–6259

Mercury Methylation by the Methanogen *Methanospirillum hungatei*

Ri-Qing Yu, John R. Reinfeldt, Mark E. Hines, Tamar Barkay 6325–6330

Microbial Contents of Vacuum Cleaner Bag Dust and Emitted Bioaerosols and Their Implications for Human Exposure Indoors

Marc Veillette, Luke D. Knibbs, Ariane Pelletier, Remi Charlebois, Pascale Blais Lecours, Congrong He, Lidia Morawska, Caroline Duchaine 6331–6336

Functional Identification of Rubber Oxygenase (RoxA) in Soil and Marine Myxobacteria

Jakob Birke, Wolf Röther, Georg Schmitt, Dieter Jendrossek 6391–6399

*Methanosarcinaceae* and Acetate-Oxidizing Pathways Dominate in High-Rate Thermophilic Anaerobic Digestion of Waste-Activated Sludge

Dang P. Ho, Paul D. Jensen, Damien J. Batstone 6491–6500

### ENZYMOLGY AND PROTEIN ENGINEERING

Integrating Terminal Truncation and Oligopeptide Fusion for a Novel Protein Engineering Strategy To Improve Specific Activity and Catalytic Efficiency: Alkaline  $\alpha$ -Amylase as a Case Study

Haiquan Yang, Long Liu, Hyun-dong Shin, Rachel R. Chen, Jianghua Li, Guocheng Du, Jian Chen 6429–6438



## FOOD MICROBIOLOGY

Raman Spectroscopy and Chemometrics for Identification and Strain Discrimination of the Wine Spoilage Yeasts *Saccharomyces cerevisiae*, *Zygosaccharomyces bailii*, and *Brettanomyces bruxellensis*

Susan B. Rodriguez, Mark A. Thornton, Roy J. Thornton 6264–6270

Comparative Genomic and Transcriptomic Analyses Reveal Habitat Differentiation and Different Transcriptional Responses during Pectin Metabolism in *Alishewanella* Species

Jaejoon Jung, Woojun Park 6351–6361

Microgradients of pH Do Not Occur around *Lactococcus* Colonies in a Model Cheese

Sophie Jeanson, Juliane Floury, Al Amine Issulahi, Marie-Noëlle Madec, Anne Thierry, Sylvie Lortal 6516–6518

## GENETICS AND MOLECULAR BIOLOGY

Metabolism of Four  $\alpha$ -Glycosidic Linkage-Containing Oligosaccharides by *Bifidobacterium breve* UCC2003

Kerry Joan O'Connell, Mary O'Connell Motherway, John O'Callaghan, Gerald F. Fitzgerald, R. Paul Ross, Marco Ventura, Catherine Stanton, Douwe van Sinderen 6280–6292

RNase III Is Required for Actinomycin Production in *Streptomyces antibioticus*

Jung-Hoon Lee, Marcha L. Gatewood, George H. Jones 6447–6451

## GEOMICROBIOLOGY

U(VI) Reduction by Diverse Outer Surface *c*-Type Cytochromes of *Geobacter sulfurreducens*

Roberto Orellana, Janet J. Leavitt, Luis R. Comolli, Roseann Csencsits, Noemie Janot, Kelly A. Flanagan, Arianna S. Gray, Ching Leang, Mounir Izallalen, Tünde Mester, Derek R. Lovley 6369–6374

## INVERTEBRATE MICROBIOLOGY

Assessment of Survival and Body Size Variation of *Culicoides imicola* (Diptera: Ceratopogonidae) as Functions of "Candidatus Cardinium" (*Bacteroidetes*) Infection Status

N. Morag, B. A. Mullens, Y. Gottlieb 6260–6263

A Fungal Insecticide Engineered for Fast *Per Os* Killing of Caterpillars Has High Field Efficacy and Safety in Full-Season Control of Cabbage Insect Pests

Yong-Jie Liu, Jing Liu, Sheng-Hua Ying, Shu-Sheng Liu, Ming-Guang Feng 6452–6458

## METHODS

Detection of *Escherichia coli* O157 by Peptide Nucleic Acid Fluorescence *In Situ* Hybridization (PNA-FISH) and Comparison to a Standard Culture Method

C. Almeida, J. M. Sousa, R. Rocha, L. Cerqueira, S. Fanning, N. F. Azevedo, M. J. Vieira 6293–6300

Monitoring the Metabolic State of Fungal Hyphae and the Presence of Melanin by Nonlinear Spectral Imaging

Helene Knaus, Gerhard A. Blab, Alexandra V. Agronskaia, Dave J. van den Heuvel, Hans C. Gerritsen, Han A. B. Wösten 6345–6350

Development of a Tunable Wide-Range Gene Induction System Useful for the Study of Streptococcal Toxin-Antitoxin Systems

Zhoujie Xie, Fengxia Qi, Justin Merritt 6375–6384

Benchmarking Various Green Fluorescent Protein Variants in *Bacillus subtilis*, *Streptococcus pneumoniae*, and *Lactococcus lactis* for Live Cell Imaging

Wout Overkamp, Katrin Beilharz, Ruud Detert Oude Weme, Ana Solopova, Harma Karsens, Ákos T. Kovács, Jan Kok, Oscar P. Kuipers, Jan-Willem Veening 6481–6490

## MICROBIAL ECOLOGY

Novel Cultivation-Based Approach To Understanding the Miscellaneous Crenarchaeotic Group (MCG) Archaea from Sedimentary Ecosystems

Emma J. Gagen, Harald Huber, Travis Meador, Kai-Uwe Hinrichs, Michael Thomm 6400–6406

**Temporal Changes and Altitudinal Distribution of Aerobic Anoxygenic Phototrophs in Mountain Lakes**

Zuzana Čuperová, Evelyn Holzer, Ivette Salka, Ruben Sommaruga, Michal Koblížek 6439–6446

**MYCOLOGY**

**The MAP Kinase Slt2 Is Involved in Vacuolar Function and Actin Remodeling in *Saccharomyces cerevisiae* Mutants Affected by Endogenous Oxidative Stress**

Nuria Pujol-Carrion, Mima I. Petkova, Luis Serrano, Maria Angeles de la Torre-Ruiz 6459–6471

**PHYSIOLOGY**

**Exploring the Biosynthesis of Unsaturated Fatty Acids in *Bacillus cereus* ATCC 14579 and Functional Characterization of Novel Acyl-Lipid Desaturases**

Lorena Chazarreta Cifré, Mariana Alemany, Diego de Mendoza, Silvia Altabe 6271–6279

***mhpT* Encodes an Active Transporter Involved in 3-(3-Hydroxyphenyl)Propionate Catabolism by *Escherichia coli* K-12**

Ying Xu, Bing Chen, Hongjun Chao, Ning-Yi Zhou 6362–6368

**X-Ray Absorption Near-Edge Structure (XANES) Spectroscopy Study of the Interaction of Silver Ions with *Staphylococcus aureus*, *Listeria monocytogenes*, and *Escherichia coli***

Gudrun Lisa Bovenkamp, Ulrike Zenzen, Katla Sai Krishna, Josef Hormes, Alexander Prange 6385–6390

**PLANT MICROBIOLOGY**

**Proteomic Analysis of the Quorum-Sensing Regulon in *Pantoea stewartii* and Identification of Direct Targets of EsaR**

Revathy Ramachandran, Ann M. Stevens 6244–6252

**Functional and Expression Analysis of the Metal-Inducible *dmeRF* System from *Rhizobium leguminosarum* bv. *viciae***

L. Rubio-Sanz, R. I. Prieto, J. Imperial, J. M. Palacios, B. Brito 6414–6422

**Effects of Inoculum Additions in the Presence of a Preestablished Arbuscular Mycorrhizal Fungal Community**

Martina Janoušková, Karol Krak, Cameron Wagg, Helena Štorchová, Petra Čaklová, Miroslav Vosátka 6507–6515

**PUBLIC HEALTH MICROBIOLOGY**

**Prevalence of Hemolysin Genes and Comparison of *ehxA* Subtype Patterns in Shiga Toxin-Producing *Escherichia coli* (STEC) and Non-STEC Strains from Clinical, Food, and Animal Sources**

Sandra C. Lorenz, Insook Son, Anna Maounounen-Laasri, Andrew Lin, Markus Fischer, Julie A. Kase 6301–6311

**Fecal Shedding of Zoonotic Food-Borne Pathogens by Wild Rodents in a Major Agricultural Region of the Central California Coast**

Christopher Kilonzo, Xunde Li, Eduardo J. Vivas, Michele T. Jay-Russell, Kristine L. Fernandez, Edward R. Atwill 6337–6344

**Behavior of *Yersinia enterocolitica* in the Presence of the Bacterivorous *Acanthamoeba castellanii***

E. Lambrecht, J. Baré, I. Van Damme, W. Bert, K. Sabbe, K. Houf 6407–6413

**Environmental Surveillance of Human Parechoviruses in Sewage in the Netherlands**

W. J. Lodder, M. Wuite, A. M. de Roda Husman, S. A. Rutjes 6423–6428

**Subtyping of a Large Collection of Historical *Listeria monocytogenes* Strains from Ontario, Canada, by an Improved Multilocus Variable-Number Tandem-Repeat Analysis (MLVA)**

S. Saleh-Lakha, V. G. Allen, J. Li, F. Pagotto, J. Odumeru, E. Taboada, M. Lombos, K. C. Tabing, B. Blais, D. Ogunremi, G. Downing, S. Lee, A. Gao, C. Nadon, S. Chen 6472–6480

**Comparison of PCR versus Culture for Detection of *Mycobacterium bovis* after Experimental Inoculation of Various Matrices Held under Environmental Conditions for Extended Periods**

Angela P. Adams, Steven R. Bolin, Amanda E. Fine, Carole A. Bolin, John B. Kaneene 6501–6506

**AUTHOR'S CORRECTION**

**Intracellular Free Iron and Its Potential Role in Ultrahigh-Pressure-Induced Inactivation of *Escherichia coli***

Yuan Yan, Joy G. Waite-Cusic, Periannan Kuppusamy, Ahmed E. Yousef 6519

**A Defined, Glucose-Limited Mineral Medium for the Cultivation of *Listeria* spp.**

Rudolf Schneebeli, Thomas Egli

6520

**RETRACTION**

**Multidrug Therapy and Evolution of Antibiotic Resistance: When Order Matters**

Gabriel G. Perron, Sergey Kryazhimskiy, Daniel P. Rice, Angus Buckling

6521

## TABLE OF CONTENTS

### SPOTLIGHT

Articles of Significant Interest Selected from This Issue by the Editors

6523

### MINIREVIEW

Mapping of Heavy Metal Ion Sorption to Cell-Extracellular Polymeric Substance-Mineral Aggregates by Using Metal-Selective Fluorescent Probes and Confocal Laser Scanning Microscopy

Likai Hao, Jianli Li, Andreas Kappler, Martin Obst 6524–6534

### BIODEGRADATION

Diversity and Ecophysiology of New Isolates of Extremely Acidophilic CS<sub>2</sub>-Converting *Acidithiobacillus* Strains

Marjan J. Smeulders, Arjan Pol, Marcel H. Zandvoort, Mike S. M. Jetten, Huub J. M. Op den Camp 6784–6794

### BIOTECHNOLOGY

Engineered *Escherichia coli* with Periplasmic Carbonic Anhydrase as a Biocatalyst for CO<sub>2</sub> Sequestration

Byung Hoon Jo, Im Gyu Kim, Jeong Hyun Seo, Dong Gyun Kang, Hyung Joon Cha 6697–6705

Dual Substrate Specificity of an *N*-Acetylglucosamine Phosphotransferase System in *Clostridium beijerinckii*

Naief H. Al Makishah, Wilfrid J. Mitchell 6712–6718

Development of Fatty Acid-Producing *Corynebacterium glutamicum* Strains

Seiki Takeno, Manami Takasaki, Akinobu Urabayashi, Akinori Mimura, Tetsuhiro Muramatsu, Satoshi Mitsuhashi, Masato Ikeda 6776–6783

Probing 3-Hydroxyflavone for *In Vitro* Glycorandomization of Flavonols by YjiC

Ramesh Prasad Pandey, Prakash Parajuli, Niranjan Koirala, Je Won Park, Jae Kyung Sohng 6833–6838

### ENVIRONMENTAL MICROBIOLOGY

Use of Aliphatic *n*-Alkynes To Discriminate Soil Nitrification Activities of Ammonia-Oxidizing Thaumarchaea and Bacteria

Anne E. Taylor, Neeraja Vajrala, Andrew T. Giguere, Alix I. Gitelman, Daniel J. Arp, David D. Myrold, Luis Sayavedra-Soto, Peter J. Bottomley 6544–6551

Exoproteome Profiles of *Clostridium cellulovorans* Grown on Various Carbon Sources

Kazuma Matsui, Jungu Bae, Kohei Esaka, Hironobu Morisaka, Kouichi Kuroda, Mitsuyoshi Ueda 6576–6584

*Lysobacter enzymogenes* Uses Two Distinct Cell-Cell Signaling Systems for Differential Regulation of Secondary-Metabolite Biosynthesis and Colony Morphology

Guoliang Qian, Yulan Wang, Yiru Liu, Feifei Xu, Ya-Wen He, Liangcheng Du, Vittorio Venturi, Jiaqin Fan, Baishi Hu, Fengquan Liu 6604–6616

Streptomycin Application Has No Detectable Effect on Bacterial Community Structure in Apple Orchard Soil

Ashley Shade, Amy K. Klimowicz, Russell N. Spear, Matthew Linske, Justin J. Donato, Clifford S. Hogan, Patricia S. McManus, Jo Handelsman 6617–6625

Stationary Phase and Nutrient Levels Trigger Transcription of a Genomic Locus Containing a Novel Peptide (TM1316) in the Hyperthermophilic Bacterium *Thermotoga maritima*

Andrew D. Frock, Clemente I. Montero, Sara E. Blumer-Schuetter, Robert M. Kelly 6637–6646



Occurrence and Genetic Diversity of *Arcobacter butzleri* in an Artisanal Dairy Plant in Italy

Federica Giacometti, Alex Lucchi, Gerardo Manfreda, Daniela Florio, Renato Giulio Zanoni, Andrea Serraino 6665–6669

New Approaches Indicate Constant Viral Diversity despite Shifts in Assemblage Structure in an Australian Hypersaline Lake

Joanne B. Emerson, Brian C. Thomas, Karen Andrade, Karla B. Heidelberg, Jillian F. Banfield 6755–6764

The Genome of the Alga-Associated Marine Flavobacterium *Formosa agariphila* KMM 3901<sup>T</sup> Reveals a Broad Potential for Degradation of Algal Polysaccharides

Alexander J. Mann, Richard L. Hahnke, Sixing Huang, Johannes Werner, Peng Xing, Tristan Barbeyron, Bruno Huettel, Kurt Stüber, Richard Reinhardt, Jens Harder, Frank Oliver Glöckner, Rudolf I. Amann, Hanno Teeling 6813–6822

## ENZYMOLGY AND PROTEIN ENGINEERING

Insertion of Endocellulase Catalytic Domains into Thermostable Consensus Ankyrin Scaffolds: Effects on Stability and Cellulolytic Activity

Eva S. Cunha, Christine L. Hatem, Doug Barrick 6684–6696

Arabinoxylan Oligosaccharide Hydrolysis by Family 43 and 51 Glycosidases from *Lactobacillus brevis* DSM 20054

Herbert Michlmayr, Johannes Hell, Cindy Lorenz, Stefan Böhmendorfer, Thomas Rosenau, Wolfgang Kneifel 6747–6754

## EVOLUTIONARY AND GENOMIC MICROBIOLOGY

From Green to Red: Horizontal Gene Transfer of the Phycoerythrin Gene Cluster between *Planktothrix* Strains

Ave Tooming-Klunderud, Hanne Sogge, Trine Ballestad Rounge, Alexander J. Nederbragt, Karin Lagesen, Gernot Glöckner, Paul K. Hayes, Thomas Rohrlack, Kjetill S. Jakobsen 6803–6812

## FOOD MICROBIOLOGY

Marked Synergistic Bactericidal Effects and Mode of Action of Medium-Chain Fatty Acids in Combination with Organic Acids against *Escherichia coli* O157:H7

S. A. Kim, M. S. Rhee 6552–6560

Simultaneous Near-Infrared Radiant Heating and UV Radiation for Inactivating *Escherichia coli* O157:H7 and *Salmonella enterica* Serovar Typhimurium in Powdered Red Pepper (*Capsicum annuum* L.)

Jae-Won Ha, Dong-Hyun Kang 6568–6575

Environmental Detection of Genogroup I, II, and IV Noroviruses by Using a Generic Real-Time Reverse Transcription-PCR Assay

Takayuki Miura, Sylvain Parnaudeau, Marco Grodzki, Satoshi Okabe, Robert L. Atmar, Françoise S. Le Guyader 6585–6592

Moderate Prevalence of Antimicrobial Resistance in *Escherichia coli* Isolates from Lettuce, Irrigation Water, and Soil

Kevin Holvoet, Imca Sampers, Benedicte Callens, Jeroen Dewulf, Mieke Uyttendaele 6677–6683

Modeling of Fungal and Bacterial Spore Germination under Static and Dynamic Conditions

Micha Peleg, Mark D. Normand 6765–6775

## GENETICS AND MOLECULAR BIOLOGY

Molecular Analysis of the *Acinetobacter baumannii* Biofilm-Associated Protein

H. M. Sharon Goh, Scott A. Beatson, Makrina Totsika, Danilo G. Moriel, Minh-Duy Phan, Jan Szubert, Naomi Runnegar, Hanna E. Sidjabat, David L. Paterson, Graeme R. Nimmo, Jeffrey Lipman, Mark A. Schembri 6535–6543

Design and Optimization of Short DNA Sequences That Can Be Used as 5' Fusion Partners for High-Level Expression of Heterologous Genes in *Escherichia coli*

Veronika Kucharova, Jørgen Skancke, Trygve Brautaset, Svein Valla 6655–6664

Antimicrobial Nodule-Specific Cysteine-Rich Peptides Induce Membrane Depolarization-Associated Changes in the Transcriptome of *Sinorhizobium meliloti*

Hilda Tiricz, Attila Szűcs, Attila Farkas, Bernadett Pap, Rui M. Lima, Gergely Maróti, Éva Kondorosi, Attila Kereszt 6737–6746

Substrate-Induced Transcriptional Activation of the MoCel7C Cellulase Gene Is Associated with Methylation of Histone H3 at Lysine 4 in the Rice Blast Fungus *Magnaporthe oryzae*

Ba Van Vu, Kieu Thi Minh Pham, Hitoshi Nakayashiki 6823–6832

## METHODS

Fluorescence-Based Bacterial Bioreporter for Specific Detection of Methyl Halide Emissions in the Environment

Muhammad Farhan Ul Haque, Thierry Nadalig, Françoise Bringel, Hubert Schaller, Stéphane Vuilleumier 6561–6567

Distribution-Based Clustering: Using Ecology To Refine the Operational Taxonomic Unit

Sarah P. Preheim, Allison R. Perrotta, Antonio M. Martin-Platero, Anika Gupta, Eric J. Alm 6593–6603

Development of a DNA Microarray Method for Detection and Identification of All 15 Distinct O-Antigen Forms of *Legionella pneumophila*

Boyang Cao, Fangfang Yao, Xiangqian Liu, Lu Feng, Lei Wang 6647–6654

An Improved PCR-Restriction Fragment Length Polymorphism (RFLP) Method for the Identification of *cryI*-Type Genes

Changlong Shu, Dongming Liu, Zishan Zhou, Jilin Cai, Qi Peng, Jiguo Gao, Fuping Song, Jie Zhang 6706–6711

Visualization of Imbalances in Sulfur Assimilation and Synthesis of Sulfur-Containing Amino Acids at the Single-Cell Level

Kristina Hoffmann, Alexander Grünberger, Frank Lausberg, Michael Bott, Lothar Eggeling 6730–6736

Cumate-Inducible Gene Expression System for Sphingomonads and Other *Alphaproteobacteria*

Andreas Kaczmarczyk, Julia A. Vorholt, Anne Francez-Charlot 6795–6802

## MICROBIAL ECOLOGY

Impact of Land Use on Arbuscular Mycorrhizal Fungal Communities in Rural Canada

Mulan Dai, Luke D. Bainard, Chantal Hamel, Yantai Gan, Derek Lynch 6719–6729

## MYCOLOGY

Differential Gene Expression in *Pycnoporus coccineus* during Interspecific Mycelial Interactions with Different Competitors

Yonathan Arfi, Anthony Levasseur, Eric Record 6626–6636

Bimodular Peptide Synthetase SidE Produces Fumarylalanine in the Human Pathogen *Aspergillus fumigatus*

Wieland Steinchen, Gerald Lackner, Sabiha Yasmin, Markus Schrettl, Hans-Martin Dahse, Hubertus Haas, Dirk Hoffmeister 6670–6676

*Cover photograph* (Copyright © 2013, American Society for Microbiology. All Rights Reserved): Expression profiles of genes involved in glycolysis, the pentose phosphate pathway, the tricarboxylic acid cycle, and the glyoxylate bypass. Colors indicate different strains, while color intensity indicates relative expression levels. The glyoxylate bypass was highly expressed in three *Alishewanella* species when pectin was provided as the sole carbon source. Based on transcriptomic and experimental data, it is proposed that the oxidative stress generated during pectin metabolism induces the glyoxylate bypass. Background images are (from top to bottom) the isolation location (tidal flats), Korean fermented food, and soil. (See related article in October 2013, vol. 79, no. 20, p. 6351.)

## TABLE OF CONTENTS

### SPOTLIGHT

Articles of Significant Interest Selected from This Issue by the Editors

6839

### MINIREVIEW

Resistance to Quorum-Quenching Compounds

Rodolfo García-Contreras, Toshinari Maeda, Thomas K. Wood 6840–6846

### BIODEGRADATION

Functional Genotyping of *Sulfurospirillum* spp. in Mixed Cultures Allowed the Identification of a New Tetrachloroethene Reductive Dehalogenase

Géraldine F. Buttet, Christof Holliger, Julien Maillard 6941–6947

### BIOTECHNOLOGY

Fatty Alcohols for Wax Esters in *Marinobacter aquaeolei* VT8: Two Optional Routes in the Wax Biosynthesis Pathway

Eric M. Lenneman, Janet M. Ohlert, Nagendra P. Palani, Brett M. Barney 7055–7062

Analysis of Genes for Succinoyl Trehalose Lipid Production and Increasing Production in *Rhodococcus* sp. Strain SD-74

Tomohiro Inaba, Yuta Tokumoto, Yusuke Miyazaki, Naoyuki Inoue, Hideaki Maseda, Toshiaki Nakajima-Kambe, Hiroo Uchiyama, Nobuhiko Nomura 7082–7090

Characterization of CpdC, a Large-Ring Lactone-Hydrolyzing Enzyme from *Pseudomonas* sp. Strain HI-70, and Its Use as a Fusion Tag Facilitating Overproduction of Proteins in *Escherichia coli*

Yali Xu, Stephan Grosse, Hiroaki Iwaki, Yoshie Hasegawa, Peter C. K. Lau 7091–7100

### ENVIRONMENTAL MICROBIOLOGY

*Pseudoalteromonas* spp. Serve as Initial Bacterial Attractants in Mesocosms of Coastal Waters but Have Subsequent Antifouling Capacity in Mesocosms and when Embedded in Paint

Nete Bernbom, Yoke Yin Ng, Stefan Møller Olsen, Lone Gram 6885–6893

Phylogenetic and Chemical Diversity of a Hybrid-Isoprenoid-Producing Streptomyces Lineage

Kelley A. Gallagher, Kristin Rauscher, Laura Pavan Ioca, Paul R. Jensen 6894–6902

Isolation of Butanol- and Isobutanol-Tolerant Bacteria and Physiological Characterization of Their Butanol Tolerance

Manabu Kanno, Taiki Katayama, Hideyuki Tamaki, Yasuo Mitani, Xian-Ying Meng, Tomoyuki Hori, Takashi Narihito, Naoki Morita, Tamotsu Hoshino, Isao Yumoto, Nobutada Kimura, Satoshi Hanada, Yoichi Kamagata 6998–7005

Thermal Inactivation of Desiccation-Adapted *Salmonella* spp. in Aged Chicken Litter

Zhao Chen, Junshu Diao, Muthu Dharmasena, Claudia Ionita, Xiuping Jiang, James Rieck 7013–7020

Fungal Diversity in Permafrost and Tallgrass Prairie Soils under Experimental Warming Conditions

C. Ryan Penton, Derek St. Louis, James R. Cole, Yiqi Luo, Liyou Wu, E. A. G. Schuur, Jizhong Zhou, James M. Tiedje 7063–7072

Role of Filamentous Phage SW1 in Regulating the Lateral Flagella of *Shewanella piezotolerans* Strain WP3 at Low Temperatures

Huahua Jian, Xiang Xiao, Fengping Wang 7101–7109



## EVOLUTIONARY AND GENOMIC MICROBIOLOGY

## Gains of Bacterial Flagellar Motility in a Fungal World

Martin Pion, Redouan Bshary, Saskia Bindschedler, Sevasti Filippidou, Lukas Y. Wick, Daniel Job, Pilar Junier 6862–6867

Genome Sequence Analysis Indicates that the Model Eukaryote *Nematostella vectensis* Harbors Bacterial Consorts

Irena I. Artamonova, Arcady R. Mushegian 6868–6873

*Bifidobacterium animalis* subsp. *lactis* ATCC 27673 Is a Genomically Unique Strain within Its Conserved Subspecies

Joseph R. Loquasto, Rodolphe Barrangou, Edward G. Dudley, Buffy Stahl, Chun Chen, Robert F. Roberts 6903–6910

## FOOD MICROBIOLOGY

Characterization of a Potential *Listeria monocytogenes* Virulence Factor Associated with Attachment to Fresh Produce

Dongryeoul Bae, Keun Seok Seo, Ting Zhang, Chinling Wang 6855–6861

Prevalences of Shiga Toxin Subtypes and Selected Other Virulence Factors among Shiga-Toxigenic *Escherichia coli* Strains Isolated from Fresh Produce

Peter C. H. Feng, Shanker Reddy 6917–6923

BopA Does Not Have a Major Role in the Adhesion of *Bifidobacterium bifidum* to Intestinal Epithelial Cells, Extracellular Matrix Proteins, and Mucus

Veera Kainulainen, Justus Reunanen, Kaisa Hiippala, Simone Guglielmetti, Satu Vesterlund, Airi Palva, Reetta Satokari 6989–6997

## Survival of Murine Norovirus, Tulane Virus, and Hepatitis A Virus on Alfalfa Seeds and Sprouts during Storage and Germination

Qing Wang, Kirsten A. Hirneisen, Sarah M. Markland, Kalmia E. Kniel 7021–7027

## GENETICS AND MOLECULAR BIOLOGY

Molecular and Phenotypic Characterization of *Escherichia coli* O26:H8 among Diarrheagenic *E. coli* O26 Strains Isolated in Brazil

Roxane M. F. Piazza, Sabine Delannoy, Patrick Fach, Halha O. Saridakis, Margareth Z. Pedroso, Letícia B. Rocha, Tânia A. T. Gomes, Mônica A. M. Vieira, Lothar Beutin, Beatriz E. C. Guth 6847–6854

Insights into the Mode of Action of Benzyl Isothiocyanate on *Campylobacter jejuni*

Virginie Dufour, Martin Stahl, Eric Rosenfeld, Alain Stintzi, Christine Baysse 6958–6968

Cloning and Heterologous Expression of the Thioviridamide Biosynthesis Gene Cluster from *Streptomyces olivoviridis*

Masumi Izawa, Takashi Kawasaki, Yoichi Hayakawa 7110–7113

## INVERTEBRATE MICROBIOLOGY

Efficient Production of *Bacillus thuringiensis* Cry1A<sub>Mod</sub> Toxins under Regulation of *cry3Aa* Promoter and Single Cysteine Mutations in the Protoxin Region

Blanca I. García-Gómez, Jorge Sánchez, Diana L. Martínez de Castro, Jorge E. Ibarra, Alejandra Bravo, Mario Soberón 6969–6973

Noninvasive Analysis of Microbiome Dynamics in the Fruit Fly *Drosophila melanogaster*

Christine Fink, Fabian Staubach, Sven Kuenzel, John F. Baines, Thomas Roeder 6984–6988

Characterization of the Bacterial Community of the Chemically Defended Hawaiian Sacoglossan *Elysia rufescens*

Jeanette Davis, W. Florian Fricke, Mark T. Hamann, Eduardo Esquenazi, Pieter C. Dorrestein, Russell T. Hill 7073–7081

## METHODS

Novel Method for Genomic Promoter Shuffling by Using Recyclable Cassettes

Xuelei Tian, Xin Xu, Wei Xiao 7042–7047

Rapid Sample Processing for Detection of Food-Borne Pathogens via Cross-Flow Microfiltration

Xuan Li, Eduardo Ximenes, Mary Anne Roshni Amalaradjou, Hunter B. Vibbert, Kirk Foster, Jim Jones, Xingya Liu, Arun K. Bhunia, Michael R. Ladisch 7048–7054

## MICROBIAL ECOLOGY

Probing the Functional Diversity of Global Pristine Soil Communities with 3-Chlorobenzoate Reveals that Communities of Generalists Dominate Catabolic Transformation

Albert N. Rhodes, Roberta R. Fulthorpe, James M. Tiedje 6932–6940

## MYCOLOGY

Structural Features of Sugars That Trigger or Support Conidial Germination in the Filamentous Fungus *Aspergillus niger*

Kimran Hayer, Malcolm Stratford, David B. Archer 6924–6931

## PHYSIOLOGY

Novel Mono-, Di-, and Trimethylornithine Membrane Lipids in Northern Wetland Planctomycetes

Eli K. Moore, Ellen C. Hopmans, W. Irene C. Rijpstra, Laura Villanueva, Svetlana N. Dedysh, Irina S. Kulichevskaya, Hans Wienk, Frans Schoutsen, Jaap S. Sinninghe Damsté 6874–6884

Transcriptional Response of the Archaeal Ammonia Oxidizer *Nitrosopumilus maritimus* to Low and Environmentally Relevant Ammonia Concentrations

Tatsunori Nakagawa, David A. Stahl 6911–6916

C<sub>1</sub> Metabolism in *Corynebacterium glutamicum*: an Endogenous Pathway for Oxidation of Methanol to Carbon Dioxide

Sabrina Witthoff, Alice Mühlroth, Jan Marienhagen, Michael Bott 6974–6983

*Thermotoga lettingae* Can Salvage Cobinamide To Synthesize Vitamin B<sub>12</sub>

Nicholas C. Butzin, Michael A. Secinaro, Kristen S. Swithers, J. Peter Gogarten, Kenneth M. Noll 7006–7012

Unraveling the Leloir Pathway of *Bifidobacterium bifidum*: Significance of the Uridyltransferases

Frederik De Bruyn, Joeri Beauprez, Jo Maertens, Wim Soetaert, Marjan De Mey 7028–7035

## PLANT MICROBIOLOGY

Tomato Fruit and Seed Colonization by *Clavibacter michiganensis* subsp. *michiganensis* through External and Internal Routes

Matthew A. Tancos, Laura Chalupowicz, Isaac Barash, Shulamit Manulis-Sasson, Christine D. Smart 6948–6957

## PUBLIC HEALTH MICROBIOLOGY

Lineage and Genogroup-Defining Single Nucleotide Polymorphisms of *Escherichia coli* O157:H7

Woo Kyung Jung, James L. Bono, Michael L. Clawson, Shana R. Leopold, Smriti Shringi, Thomas E. Besser 7036–7041

**AUTHOR'S CORRECTION**

**Ruminant Rhombencephalitis-Associated *Listeria monocytogenes* Strains Constitute a Genetically Homogeneous Group Related to Human Outbreak Strains**

Paulo Ricardo Dell'Armeline Rocha,  
Sara Lomonaco, Maria Teresa Bottero,  
Alessandra Dalmasso, Alessandro  
Dondo, Carla Grattarola, Fabio  
Zucon, Barbara Iulini, Stephen John  
Knabel, Maria Teresa Capucchio,  
Cristina Casalone

7114

## TABLE OF CONTENTS

### SPOTLIGHT

Articles of Significant Interest Selected from This Issue by the Editors

7115

### MINIREVIEW

Bacterial Persister Cell Formation and Dormancy

Thomas K. Wood, Stephen J. Knabel,  
Brian W. Kwan

7116–7121

### BIODEGRADATION

Fungal Communities Associated with the Biodegradation of Polyester Polyurethane Buried under Compost at Different Temperatures

Urooj Zafar, Ashley Houlden, Geoffrey  
D. Robson

7313–7324

Novel Gene Clusters and Metabolic Pathway Involved in 3,5,6-Trichloro-2-Pyridinol Degradation by *Ralstonia* sp. Strain T6

Jingquan Li, Yan Huang, Ying Hou,  
Xiangmin Li, Hui Cao, Zhongli Cui

7445–7453

### BIOTECHNOLOGY

Using Transcriptomics To Improve Butanol Tolerance of *Synechocystis* sp. Strain PCC 6803

Josefine Anfelt, Björn Hallström, Jens  
Nielsen, Mathias Uhlén, Elton P.  
Hudson

7419–7427

### ENVIRONMENTAL MICROBIOLOGY

Bacterial Contribution to Dissolved Organic Matter in Eutrophic Lake Kasumigaura, Japan

Nobuyuki Kawasaki, Kazuhiro  
Komatsu, Ayato Kohzu, Noriko  
Tomioka, Ryuichiro Shinohara,  
Takayuki Satou, Fumiko Nara  
Watanabe, Yuya Tada, Koji Hamasaki,  
M. R. M. Kushairi, Akio Imai

7160–7168

Overexpression of *fetA* (*ybbL*) and *fetB* (*ybbM*), Encoding an Iron Exporter, Enhances Resistance to Oxidative Stress in *Escherichia coli*

Sergios A. Nicolaou, Alan G. Fast, Eiko  
Nakamaru-Ogiso, Eleftherios T.  
Papoutsakis

7210–7219

Identification of CtpL as a Chromosomally Encoded Chemoreceptor for 4-Chloroaniline and Catechol in *Pseudomonas aeruginosa* PAO1

Alisa S. Vangnai, Kazuki Takeuchi,  
Shota Oku, Naoya Kataoka, Tisana  
Nitisakulkan, Takahisa Tajima, Junichi  
Kato

7241–7248

Species Co-Occurrence Patterns among Lyme Borreliosis Pathogens in the Tick Vector *Ixodes ricinus*

Coralie Herrmann, Lise Gern, Maarten  
J. Voordouw

7273–7280

Stark Contrast in Denitrification and Anammox across the Deep Norwegian Trench in the Skagerrak

Mark Trimmer, Pia Engström, Bo  
Thamdrup

7381–7389

Early and Late Trisporoids Differentially Regulate  $\beta$ -Carotene Production and Gene Transcript Levels in the Mucoralean Fungi *Blakeslea trispora* and *Mucor mucedo*

Yamuna Sahadevan, Mareike Richter-  
Fecken, Kerstin Kaerger, Kerstin Voigt,  
Wilhelm Boland

7466–7475

Cooperative Degradation of Chitin by Extracellular and Cell Surface-Expressed Chitinases from *Paenibacillus* sp. Strain FPU-7

Takafumi Itoh, Takao Hibi, Yutaka  
Fujii, Ikumi Sugimoto, Akihiro  
Fujiwara, Fumiko Suzuki, Yukimoto  
Iwasaki, Jin-Kyung Kim, Akira Taketo,  
Hisashi Kimoto

7482–7490

Composite Bacterial Hopanoids and Their Microbial Producers across Oxygen Gradients in the Water Column of the California Current

Jenan J. Kharbush, Juan A. Ugalde,  
Shane L. Hogle, Eric E. Allen, Lihini I.  
Aluwihare

7491–7501



## ENZYMOLGY AND PROTEIN ENGINEERING

Regiospecificities and Prenylation Mode Specificities of the Fungal Indole Diterpene Prenyltransferases AtmD and PaxD

Chengwei Liu, Atsushi Minami, Motoyoshi Noike, Hiroaki Toshima, Hideaki Oikawa, Tohru Dairi 7298–7304

## EVOLUTIONARY AND GENOMIC MICROBIOLOGY

Acquired Genetic Mechanisms of a Multiresistant Bacterium Isolated from a Treatment Plant Receiving Wastewater from Antibiotic Production

Anna Johnning, Edward R. B. Moore, Liselott Svensson-Stadler, Yogesh S. Shouche, D. G. Joakim Larsson, Erik Kristiansson 7256–7263

High-Efficiency Thermal Asymmetric Interlaced PCR (hiTAIL-PCR) for Determination of a Highly Degenerated Prophage WO Genome in a *Wolbachia* Strain Infecting a Fig Wasp Species

Guan-Hong Wang, Jin-Hua Xiao, Tuan-Lin Xiong, Zi Li, Robert W. Murphy, Da-Wei Huang 7476–7481

## FOOD MICROBIOLOGY

Effect of Electroporation by Ohmic Heating for Inactivation of *Escherichia coli* O157:H7, *Salmonella enterica* Serovar Typhimurium, and *Listeria monocytogenes* in Buffered Peptone Water and Apple Juice

Il-Kyu Park, Dong-Hyun Kang 7122–7129

Preadaptation to Cold Stress in *Salmonella enterica* Serovar Typhimurium Increases Survival during Subsequent Acid Stress Exposure

Jigna Shah, Prerak T. Desai, Dong Chen, John R. Stevens, Bart C. Weimer 7281–7289

Association of a D-Alanyl-D-Alanine Carboxypeptidase Gene with the Formation of Aberrantly Shaped Cells during the Induction of Viable but Nonculturable *Vibrio parahaemolyticus*

Wei-cheng Hung, Wann-Neng Jane, Hin-chung Wong 7305–7312

Dynamics of the *Saccharomyces cerevisiae* Transcriptome during Bread Dough Fermentation

Elham Aslankoohi, Bo Zhu, Mohammad Naser Rezaei, Karin Voordeckers, Dries De Maeyer, Kathleen Marchal, Emmie Dornez, Christophe M. Courtin, Kevin J. Verstrepen 7325–7333

An Efficient Method Using *Gluconacetobacter europaeus* To Reduce an Unfavorable Flavor Compound, Acetoin, in Rice Vinegar Production

Naoki Akasaka, Hisao Sakoda, Ryota Hidese, Yuri Ishii, Shinsuke Fujiwara 7334–7342

Interactions between *Bifidobacterium* and *Bacteroides* Species in Cofermentations Are Affected by Carbon Sources, Including Exopolysaccharides Produced by *Bifidobacteria*

David Rios-Covian, Silvia Arbolea, Ana M. Hernandez-Barranco, Jorge R. Alvarez-Buylla, Patricia Ruas-Madiedo, Miguel Gueimonde, Clara G. de los Reyes-Gavilan 7518–7524

Effect of Bacteriophage Application on *Campylobacter jejuni* Loads in Commercial Broiler Flocks

Sophie Kittler, Samuel Fischer, Amir Abdulmawjood, Gerhard Glünder, Günter Klein 7525–7533

## GENETICS AND MOLECULAR BIOLOGY

Development of a Tetracycline-Inducible Gene Expression System for the Study of *Helicobacter pylori* Pathogenesis

Aleksandra W. Debowski, Phebe Verbrugghe, Miriam Sehnal, Barry James Marshall, Mohammed Benghezal 7351–7359

Snf1 Is a Regulator of Lipid Accumulation in *Yarrowia lipolytica*

John Seip, Raymond Jackson, Hongxian He, Quinn Zhu, Seung-Pyo Hong 7360–7370

*Aspergillus fumigatus* SidJ Mediates Intracellular Siderophore Hydrolysis

Mario Gründlinger, Fabio Gsaller, Markus Schrettl, Herbert Lindner, Hubertus Haas 7534–7536

## INVERTEBRATE MICROBIOLOGY

Specific Midgut Region Controlling the Symbiont Population in an Insect-Microbe Gut Symbiotic Association

Jiyeun Kate Kim, Na Hyang Kim, Ho Am Jang, Yoshitomo Kikuchi, Chan-Hee Kim, Takema Fukatsu, Bok Luel Lee 7229–7233

Components of the Cultivated Red Seaweed *Chondrus crispus* Enhance the Immune Response of *Caenorhabditis elegans* to *Pseudomonas aeruginosa* through the *pmk-1*, *daf-2/daf-16*, and *skn-1* Pathways

Jinghua Liu, Jeff Hafting, Alan T. Critchley, Arjun H. Banskota, Balakrishnan Prithiviraj 7343–7350

## METHODS

Noninvasive High-Throughput Single-Cell Analysis of the Intracellular pH of *Saccharomyces cerevisiae* by Ratiometric Flow Cytometry

Mari Valkonen, Dominik Mojzita, Merja Penttilä, Mojca Benčina 7179–7187

Development of a Tiered Multilocus Sequence Typing Scheme for Members of the *Lactobacillus acidophilus* Complex

Padmini Ramachandran, David W. Lacher, Erika A. Pfeiler, Christopher A. Elkins 7220–7228

Assessment of Persistence of *Bartonella henselae* in *Ctenocephalides felis*

Emilie Bouhsira, Michel Franc, Henri-Jean Boulouis, Philippe Jacquiet, Isabelle Raymond-Letron, Emmanuel Liénard 7439–7444

Rapid Transposon Liquid Enrichment Sequencing (TnLE-seq) for Gene Fitness Evaluation in Underdeveloped Bacterial Systems

Samuel R. Fels, Grant M. Zane, Sean M. Blake, Judy D. Wall 7510–7517

## MICROBIAL ECOLOGY

Impacts of Labile Organic Carbon Concentration on Organic and Inorganic Nitrogen Utilization by a Stream Biofilm Bacterial Community

Suchismita Ghosh, Laura G. Leff 7130–7141

Prevalence of Viral Photosynthetic and Capsid Protein Genes from Cyanophages in Two Large and Deep Perialpine Lakes

Xu Zhong, Stéphan Jacquet 7169–7178

Influence of Habitat and Climate Variables on Arbuscular Mycorrhizal Fungus Community Distribution, as Revealed by a Case Study of Facultative Plant Epiphytism under Semiarid Conditions

E. Torrecillas, P. Torres, M. M. Alguacil, J. I. Querejeta, A. Roldán 7203–7209

Termites Facilitate Methane Oxidation and Shape the Methanotrophic Community

Adrian Ho, Hans Erens, Basile Bazirake Mujinya, Pascal Boeckx, Geert Baert, Bellinda Schneider, Peter Frenzel, Nico Boon, Eric Van Ranst 7234–7240

Accumulation and Inactivation of Avian Influenza Virus by the Filter-Feeding Invertebrate *Daphnia magna*

Brandt W. Meixell, Mark A. Borchardt, Susan K. Spencer 7249–7255

Changing Dietary Calcium-Phosphorus Level and Cereal Source Selectively Alters Abundance of Bacteria and Metabolites in the Upper Gastrointestinal Tracts of Weaned Pigs

Barbara U. Metzler-Zebeli, Evelyne Mann, Stephan Schmitz-Esser, Martin Wagner, Mathias Ritzmann, Qendrim Zebeli 7264–7272

Impact of Logging and Forest Conversion to Oil Palm Plantations on Soil Bacterial Communities in Borneo

Larisa Lee-Cruz, David P. Edwards, Binu M. Tripathi, Jonathan M. Adams 7290–7297

Aerobic Biofilms Grown from Athabasca Watershed Sediments Are Inhibited by Increasing Concentrations of Bituminous Compounds

Etienne Yergeau, John R. Lawrence, Sylvie Sanschagrin, Julie L. Roy, George D. W. Swerhone, Darren R. Korber, Charles W. Greer 7398–7412

Wastewater Effluent Impacts Ammonia-Oxidizing Prokaryotes of the Grand River, Canada

Puntipar Sonthiphand, Eduardo Cejudo, Sherry L. Schiff, Josh D. Neufeld 7454–7465

## PHYSIOLOGY

Survival of Bactericidal Antibiotic Treatment by a Persister Subpopulation of *Listeria monocytogenes*

Gitte M. Knudsen, Yin Ng, Lone Gram 7390–7397

## PLANT MICROBIOLOGY

The *Sinorhizobium meliloti ntrX* Gene Is Involved in Succinoglycan Production, Motility, and Symbiotic Nodulation on Alfalfa

Dong Wang, Haiying Xue, Yiwen Wang, Ruochun Yin, Fang Xie, Li Luo 7150–7159

CelR, an Ortholog of the Diguanylate Cyclase PleD of *Caulobacter*, Regulates Cellulose Synthesis in *Agrobacterium tumefaciens*

D. Michael Barnhart, Shengchang Su, Brenna E. Baccaro, Lois M. Banta, Stephen K. Farrand 7188–7202

Role of Bacterial Communities in the Natural Suppression of *Rhizoctonia solani* Bare Patch Disease of Wheat (*Triticum aestivum* L.)

Chuntao Yin, Scot H. Hulbert, Kurtis L. Schroeder, Olga Mavrodi, Dmitri Mavrodi, Amit Dhingra, William F. Schillinger, Timothy C. Paulitz 7428–7438

## PUBLIC HEALTH MICROBIOLOGY

Detection of *Achromobacter xylosoxidans* in Hospital, Domestic, and Outdoor Environmental Samples and Comparison with Human Clinical Isolates

Lucie Amoureux, Julien Bador, Sakina Fardeheb, Cédric Mabile, Charlyne Couchot, Clémence Massip, Anne-Lise Salignon, Guillaume Berlie, Véronique Varin, Catherine Neuwirth 7142–7149

Prevalence of Diarrhea-Associated Virulence Genes and Genetic Diversity in *Escherichia coli* Isolates from Fecal Material of Various Animal Hosts

Abhirosh Chandran, Asit Mazumder 7371–7380

Occurrence of Pepper Mild Mottle Virus in Drinking Water Sources in Japan

Eiji Haramoto, Masaaki Kitajima, Naohiro Kishida, Yoshiaki Konno, Hiroyuki Katayama, Mari Asami, Michihiro Akiba 7413–7418

Occurrence of Potentially Human-Pathogenic *Escherichia coli* O103 in Norwegian Sheep

Camilla Sekse, Marianne Sunde, Petter Hopp, Torkjel Bruheim, Kofitsyo Sewornu Cudjoe, Bjørg Kvitle, Anne Margrete Urdahl 7502–7509

## TABLE OF CONTENTS

### EDITORIAL

- Acknowledgment of Reviewers Harold L. Drake 7537–7545

### SPOTLIGHT

- Articles of Significant Interest Selected from This Issue by the Editors 7546

### MINIREVIEW

- Bacteriophage Orphan DNA Methyltransferases: Insights from Their Bacterial Origin, Function, and Occurrence James Murphy, Jennifer Mahony, Stuart Ainsworth, Arjen Nauta, Douwe van Sinderen 7547–7555

### BIODEGRADATION

- Oxidation of the Cyclic Ethers 1,4-Dioxane and Tetrahydrofuran by a Monooxygenase in Two *Pseudonocardia* Species Christopher M. Sales, Ariel Grostern, Juanito V. Parales, Rebecca E. Parales, Lisa Alvarez-Cohen 7702–7708

- The Novel Bacterial *N*-Demethylase PdmAB Is Responsible for the Initial Step of *N,N*-Dimethyl-Substituted Phenylurea Herbicide Degradation Tao Gu, Chaoyang Zhou, Sebastian R. Sørensen, Ji Zhang, Jian He, Peiwen Yu, Xin Yan, Shunpeng Li 7846–7856

### BIOTECHNOLOGY

- Single-Cell Measurements of Enzyme Levels as a Predictive Tool for Cellular Fates during Organic Acid Production Stefan Zdraljevic, Drew Wagner, Kevin Cheng, Laura Ruohonen, Jussi Jäntti, Merja Penttilä, Orna Resnekov, C. Gustavo Pesce 7569–7582

- Exploring the Mechanism of Biocatalyst Inhibition in Microbial Desulfurization Andres Abin-Fuentes, Magdy El-Said Mohamed, Daniel I. C. Wang, Kristala L. J. Prather 7807–7817

- Regulation of Dual Glycolytic Pathways for Fructose Metabolism in Heterofermentative *Lactobacillus panis* PM1 Tae Sun Kang, Darren R. Korber, Takuji Tanaka 7818–7826

### ENVIRONMENTAL MICROBIOLOGY

- Characteristics of Cefotaxime-Resistant *Escherichia coli* from Wild Birds in The Netherlands Kees Veldman, Peter van Tulden, Arie Kant, Joop Testerink, Dik Mevius 7556–7561

- Effect of Incubation Temperature on the Detection of Thermophilic *Campylobacter* Species from Freshwater Beaches, Nearby Wastewater Effluents, and Bird Fecal Droppings Izhar U. H. Khan, Stephen Hill, Eva Nowak, Thomas A. Edge 7639–7645

- Abilities of the mCP Agar Method and CRENAME Alpha Toxin-Specific Real-Time PCR Assay To Detect *Clostridium perfringens* Spores in Drinking Water Andrée F. Maheux, Ève Bérubé, Dominique K. Boudreau, Romain Villéger, Philippe Cantin, Maurice Boissinot, Luc Bissonnette, Michel G. Bergeron 7654–7661

- Isolation and Characterization of *Burkholderia rinojensis* sp. nov., a Non-*Burkholderia cepacia* Complex Soil Bacterium with Insecticidal and Miticidal Activities Ana Lucia Cordova-Kreylos, Lorena E. Fernandez, Marja Koivunen, April Yang, Lina Flor-Weiler, Pamela G. Marrone 7669–7678

**Prevalence of Nonpolio Enteroviruses in the Sewage of Guangzhou City, China, from 2009 to 2012**

Huanying Zheng, Jing Lu, Yong Zhang, Hiromu Yoshida, Xue Guo, Leng Liu, Hui Li, Hanri Zeng, Ling Fang, Yanling Mo, Lina Yi, Toru Chosa, Wenbo Xu, Changwen Ke 7679–7683

**Analysis of Magnetosome Chains in Magnetotactic Bacteria by Magnetic Measurements and Automated Image Analysis of Electron Micrographs**

E. Katzmann, M. Eibauer, W. Lin, Y. Pan, J. M. Plitzko, D. Schüler 7755–7762

**Release of Free DNA by Membrane-Impaired Bacterial Aerosols Due to Aerosolization and Air Sampling**

Huajun Zhen, Taewon Han, Donna E. Fennell, Gediminas Mainelis 7780–7789

**Meta-Analysis of Quantification Methods Shows that Archaea and Bacteria Have Similar Abundances in the Subseafloor**

Karen G. Lloyd, Megan K. May, Richard T. Kevorkian, Andrew D. Steen 7790–7799

**Anaerobic Benzene Oxidation via Phenol in *Geobacter metallireducens***

Tian Zhang, Pier-Luc Tremblay, Akhilesh Kumar Chaurasia, Jessica A. Smith, Timothy S. Bain, Derek R. Lovley 7800–7806

**Dimethyl Adenosine Transferase (KsgA) Deficiency in *Salmonella enterica* Serovar Enteritidis Confers Susceptibility to High Osmolarity and Virulence Attenuation in Chickens**

Kim Lam Chiok, Tarek Addwebi, Jean Guard, Devendra H. Shah 7857–7866

**ENZYMOLGY AND PROTEIN ENGINEERING**

**Iterative Saturation Mutagenesis of –6 Subsite Residues in Cyclodextrin Glycosyltransferase from *Paenibacillus macerans* To Improve Maltodextrin Specificity for 2-O-D-Glucopyranosyl-L-Ascorbic Acid Synthesis**

Ruizhi Han, Long Liu, Hyun-dong Shin, Rachel R. Chen, Jianghua Li, Guocheng Du, Jian Chen 7562–7568

**Differential Induction of Antimicrobial REGIII by the Intestinal Microbiota and *Bifidobacterium breve* NCC2950**

Jane M. M. Natividad, Christina L. Hayes, Jean-Paul Motta, Jennifer Jury, Heather J. Galipeau, Vivek Philip, Clara L. Garcia-Rodenas, Hiroshi Kiyama, Premysl Bercik, Elena F. Verdu 7745–7754

**EVOLUTIONARY AND GENOMIC MICROBIOLOGY**

**Diverse Broad-Host-Range Plasmids from Freshwater Carry Few Accessory Genes**

Celeste J. Brown, Diya Sen, Hirokazu Yano, Matthew L. Bauer, Linda M. Rogers, Geraldine A. Van der Auwera, Eva M. Top 7684–7695

**FOOD MICROBIOLOGY**

**Risk Factors Associated with *Salmonella* and *Listeria monocytogenes* Contamination of Produce Fields**

Laura K. Strawn, Yrjo T. Gröhn, Steven Warchocki, Randy W. Worobo, Elizabeth A. Bihn, Martin Wiedmann 7618–7627

**Catabolism of Glucose and Lactose in *Bifidobacterium animalis* subsp. *lactis*, Studied by <sup>13</sup>C Nuclear Magnetic Resonance**

Irene González-Rodríguez, Paula Gaspar, Borja Sánchez, Miguel Gueimonde, Abelardo Margolles, Ana Rute Neves 7628–7638

**Microbial Ecology Dynamics during Rye and Wheat Sourdough Preparation**

Danilo Ercolini, Erica Pontonio, Francesca De Filippis, Fabio Minervini, Antonietta La Storia, Marco Gobetti, Raffaella Di Cagno 7827–7836

**GENETICS AND MOLECULAR BIOLOGY**

**Two Histone Deacetylases, Ffhda1 and Ffhda2, Are Important for *Fusarium fujikuroi* Secondary Metabolism and Virulence**

L. Studt, F. J. Schmidt, L. Jahn, C. M. K. Sieber, L. R. Connolly, E.-M. Niehaus, M. Freitag, H.-U. Humpf, B. Tudzynski 7719–7734

**Induction of the Cpx Envelope Stress Pathway Contributes to *Escherichia coli* Tolerance to Antimicrobial Peptides**

Bianca Audrain, Lionel Ferrières, Amira Zairi, Guillaume Soubigou, Curtis Dobson, Jean-Yves Coppée, Christophe Beloin, Jean-Marc Ghigo 7770–7779

**SdrA, a New DeoR Family Regulator Involved in *Streptomyces avermitilis* Morphological Development and Antibiotic Production**

Dana Ulanova, Shigeru Kitani, Eiichiro Fukusaki, Takuya Nihira 7916–7921

**INVERTEBRATE MICROBIOLOGY**

**A Novel *Rickettsia* Species Detected in Vole Ticks (*Ixodes angustus*) from Western Canada**

Clare A. Anstead, Neil B. Chilton 7583–7589

**Insecticidal Activity of *Bacillus thuringiensis* Cry1Bh1 against *Ostrinia nubilalis* (Hübner) (Lepidoptera: Crambidae) and Other Lepidopteran Pests**

Justin Lira, Jeff Beringer, Stephanie Burton, Samantha Griffin, Joel Sheets, Sek Yee Tan, Aaron Woosley, Sarah Worden, Kenneth E. Narva 7590–7597

**Glycerol-3-Phosphate Acyltransferase Contributes to Triacylglycerol Biosynthesis, Lipid Droplet Formation, and Host Invasion in *Metarhizium robertsii***

Qiang Gao, Yanfang Shang, Wei Huang, Chengshu Wang 7646–7653

**A *Chrysodeixis chalcites* Single-Nucleocapsid Nucleopolyhedrovirus Population from the Canary Islands Is Genotypically Structured To Maximize Survival**

Alexandra Bernal, Oihane Simón, Trevor Williams, Delia Muñoz, Primitivo Caballero 7709–7718

**METHODS**

**Use of a Hierarchical Oligonucleotide Primer Extension Approach for Multiplexed Relative Abundance Analysis of Methanogens in Anaerobic Digestion Systems**

Jer-Horng Wu, Hui-Ping Chuang, Mao-Hsuan Hsu, Wei-Yu Chen 7598–7609

**GET\_HOMOLOGUES, a Versatile Software Package for Scalable and Robust Microbial Pangenome Analysis**

Bruno Contreras-Moreira, Pablo Vinuesa 7696–7701

**Rapid Detection and Identification of Nontuberculous Mycobacterial Pathogens in Fish by Using High-Resolution Melting Analysis**

Thu Nguyet Phung, Domenico Caruso, Sylvain Godreuil, Nicolas Keck, Tatiana Vallaeys, Jean-Christophe Avarre 7837–7845

**MICROBIAL ECOLOGY**

**Cell Size Distributions of Soil Bacterial and Archaeal Taxa**

Maria C. Portillo, Jonathan W. Leff, Christian L. Lauber, Noah Fierer 7610–7617

**Genetic Diversity of Newcastle Disease Virus in Wild Birds and Pigeons in West Africa**

Chantal J. Snoeck, Adeniyi T. Adeyanju, Ademola A. Owoade, Emmanuel Couacy-Hymann, Bello R. Alkali, Ulf Ottosson, Claude P. Muller 7867–7874

**Feeding the Probiotic *Enterococcus faecium* Strain NCIMB 10415 to Piglets Specifically Reduces the Number of *Escherichia coli* Pathotypes That Adhere to the Gut Mucosa**

Carmen Bednorz, Sebastian Guenther, Kathrin Oelgeschläger, Bianca Kinnemann, Robert Pieper, Susanne Hartmann, Karsten Tedin, Torsten Semmler, Konrad Neumann, Peter Schierack, Astrid Bethe, Lothar H. Wieler 7896–7904

**MYCOLOGY**

**Enhanced Biotransformation of Fluoranthene by Intertidally Derived *Cunninghamella elegans* under Biofilm-Based and Niche-Mimicking Conditions**

Sayani Mitra, Arnab Pramanik, Srijoni Banerjee, Saubhik Halder, Ratan Gachhui, Joydeep Mukherjee 7922–7930

**PHYSIOLOGY**

**DNA Double-Strand Break Repair at  $-15^{\circ}\text{C}$**

Markus Dieser, John R. Battista, Brent C. Christner 7662–7668

**Lysozyme and Penicillin Inhibit the Growth of Anaerobic Ammonium-Oxidizing Planctomycetes**

Ziye Hu, Theo van Alen, Mike S. M. Jetten, Boran Kartal 7763–7769

**Evolved Cobalamin-Independent Methionine Synthase (MetE) Improves the Acetate and Thermal Tolerance of *Escherichia coli***

Elena A. Mordukhova, Jae-Gu Pan 7905–7915

**PUBLIC HEALTH MICROBIOLOGY**

**Sequence-Based Analysis of the Intestinal Microbiota of Sows and Their Offspring Fed Genetically Modified Maize Expressing a Truncated Form of *Bacillus thuringiensis* Cry1Ab Protein (Bt Maize)**

Stefan G. Buzoianu, Maria C. Walsh, Mary C. Rea, Lisa Quigley, Orla O'Sullivan, Paul D. Cotter, R. Paul Ross, Gillian E. Gardiner, Peadar G. Lawlor 7735–7744

**Laboratory Evidence of Norwalk Virus Contamination on the Hands of Infected Individuals**

Pengbo Liu, Blanca Escudero, Lee-Ann Jaykus, Julia Montes, Rebecca M. Goulter, Meredith Lichtenstein, Marina Fernandez, Joong-Chul Lee, Elizabeth De Nardo, Amy Kirby, James W. Arbogast, Christine L. Moe 7875–7881

***Aspergillus* Collagen-Like Genes (*acl*): Identification, Sequence Polymorphism, and Assessment for PCR-Based Pathogen Detection**

Kiril Tuntevski, Brandon C. Durney, Anna K. Snyder, P. Rocco LaSala, Ajay P. Nayak, Brett J. Green, Donald H. Beezhold, Rita V. M. Rio, Lisa A. Holland, Slawomir Lukomski 7882–7895

**AUTHOR'S CORRECTION**

**Characterization of a *Lactobacillus gasseri* JCM 1131<sup>T</sup> Lipoteichoic Acid with a Novel Glycolipid Anchor Structure**

Tsukasa Shiraishi, Shin-ichi Yokota, Naoki Morita, Satoru Fukiya, Satoru Tomita, Naoto Tanaka, Sanae Okada, Atsushi Yokota 7931