

# APPLIED AND ENVIRONMENTAL MICROBIOLOGY

Volume 72

March 2006

No. 3

## MINIREVIEWS

- Identifying the Dominant Soil Bacterial Taxa in Libraries of 16S rRNA and 16S rRNA Genes** Peter H. Janssen 1719–1728
- Bile Salt Hydrolase Activity in Probiotics** Máire Begley, Colin Hill, and Cormac G. M. Gahan 1729–1738

## GENETICS AND MOLECULAR BIOLOGY

- CatM Regulation of the *benABCDE* Operon: Functional Divergence of Two LysR-Type Paralogs in *Acinetobacter baylyi* ADP1** Obidimma C. Ezezika, Lauren S. Collier-Hyams, Haley A. Dale, Andrew C. Burk, and Ellen L. Neidle 1749–1758
- Conjugal Transfer of a Toxin-Coding Megaplasmid from *Bacillus thuringiensis* subsp. *israelensis* to Mosquitocidal Strains of *Bacillus sphaericus*** Katherine Gammon, Gareth W. Jones, Steven J. Hope, Cláudia M. F. de Oliveira, Lêda Regis, Maria Helena N. L. Silva Filha, Brian N. Dancer, and Colin Berry 1766–1770
- Transcriptional Analysis of the Toxin-Coding Plasmid pBtoxis from *Bacillus thuringiensis* subsp. *israelensis*** Claudia Stein, Gareth W. Jones, Tanya Chalmers, and Colin Berry 1771–1776
- Characterization of the Terephthalate Degradation Genes of *Comamonas* sp. Strain E6** Mikio Sasoh, Eiji Masai, Satoko Ishibashi, Hirofumi Hara, Naofumi Kamimura, Keisuke Miyauchi, and Masao Fukuda 1825–1832
- Resistance Determinants of a Highly Arsenic-Resistant Strain of *Leptospirillum ferriphilum* Isolated from a Commercial Biooxidation Tank** I. Marla Tuffin, Stanton B. Hector, Shelly M. Deane, and Douglas E. Rawlings 2247–2253

## ENZYMOLGY AND PROTEIN ENGINEERING

- In Vivo Enzyme Immobilization by Use of Engineered Polyhydroxyalkanoate Synthase** Verena Peters and Bernd H. A. Rehm 1777–1783
- Control of Substrate Specificity by Active-Site Residues in Nitrobenzene Dioxygenase** Kou-San Ju and Rebecca E. Parales 1817–1824
- Engineering of Cyclodextrin Glucanotransferase on the Cell Surface of *Saccharomyces cerevisiae* for Improved Cyclodextrin Production** Zhankun Wang, Qingsheng Qi, and Peng George Wang 1873–1877
- Cloning, Expression, and Characterization of Aminopeptidase P from the Hyperthermophilic Archaeon *Thermococcus* sp. Strain NA1** Hyun Sook Lee, Yun Jae Kim, Seung Seob Bae, Jeong Ho Jeon, Jae Kyu Lim, Byeong Chul Jeong, Sung Gyun Kang, and Jung-Hyun Lee 1886–1890
- Identification and Characterization of a Novel Intracellular Alkaline  $\alpha$ -Amylase from the Hyperthermophilic Bacterium *Thermotoga maritima* MSB8** Meike Ballschmiter, Ole Fütterer, and Wolfgang Liebl 2206–2211

## PHYSIOLOGY AND BIOTECHNOLOGY

- Novel Partial Reductive Pathway for 4-Chloronitrobenzene and Nitrobenzene Degradation in *Comamonas* sp. Strain CNB-1** Jian-feng Wu, Cheng-ying Jiang, Bao-jun Wang, Ying-fei Ma, Zhi-pei Liu, and Shuang-jiang Liu 1759–1765

Continued on following page

<b>Conservation of the Pho Regulon in <i>Pseudomonas fluorescens</i> Pf0-1</b>	Russell D. Monds, Peter D. Newell, Julia A. Schwartzman, and George A. O'Toole	1910–1924
<b>Genome-Based Metabolic Engineering of <i>Mannheimia succiniciproducens</i> for Succinic Acid Production</b>	Sang Jun Lee, Hyohak Song, and Sang Yup Lee	1939–1948
<b>Metabolic Engineering of <i>Corynebacterium glutamicum</i> for Trehalose Overproduction: Role of the TreYZ Trehalose Biosynthetic Pathway</b>	Jorge Carpinelli, Reinhard Krämer, and Eduardo Agosin	1949–1955
<b>Minimization of Glycerol Production during the High-Performance Fed-Batch Ethanolic Fermentation Process in <i>Saccharomyces cerevisiae</i>, Using a Metabolic Model as a Prediction Tool</b>	Carine Bideaux, Sandrine Alfenore, Xavier Cameleyre, Carole Molina-Jouve, Jean-Louis Uribelarrea, and Stéphane E. Guillouet	2134–2140
<b>Heterologous Expression of BetL, a Betaine Uptake System, Enhances the Stress Tolerance of <i>Lactobacillus salivarius</i> UCC118</b>	Vivien M. Sheehan, Roy D. Sleator, Gerald F. Fitzgerald, and Colin Hill	2170–2177
<b>Generation of Novel-Substrate-Accepting Biphenyl Dioxygenases through Segmental Random Mutagenesis and Identification of Residues Involved in Enzyme Specificity</b>	Marco Zielinski, Silke Kahl, Christine Standfuß-Gabisch, Beatriz Cámara, Michael Seeger, and Bernd Hofer	2191–2199
<b>Assessing the Impact of Denitrifier-Produced Nitric Oxide on Other Bacteria</b>	Peter S. Choi, Zeki Naal, Charles Moore, Emerilis Casado-Rivera, Hector D. Abruña, John D. Helmann, and James P. Shapleigh	2200–2205
<b>Preferential Utilization of Aromatic Compounds over Glucose by <i>Pseudomonas putida</i> CSV86</b>	Aditya Basu, Shree K. Apte, and Prashant S. Phale	2226–2230
<b>Complementation of the <i>Lactococcus lactis</i> Secretion Machinery with <i>Bacillus subtilis</i> SecDF Improves Secretion of Staphylococcal Nuclease</b>	S. Nouaille, E. Morello, N. Cortez-Peres, Y. Le Loir, J. Commissaire, J. J. Gratadoux, E. Poumerol, A. Gruss, and P. Langella	2272–2279
<b>MYCOLOGY</b>		
<b>Sedolisins, a New Class of Secreted Proteases from <i>Aspergillus fumigatus</i> with Endoprotease or Tripeptidyl-Peptidase Activity at Acidic pHs</b>	Utz Reichard, Barbara Léchenne, Abdul R. Asif, Frank Streit, Eric Grouzmann, Olivier Jousson, and Michel Monod	1739–1748
<b>Characterization of Two Polyketide Synthase Genes Involved in Zearalenone Biosynthesis in <i>Gibberella zeae</i></b>	Iffa Gaffoor and Frances Trail	1793–1799
<b>Global Carbon Utilization Profiles of Wild-Type, Mutant, and Transformant Strains of <i>Hypocrea jecorina</i></b>	Irina S. Druzhinina, Monika Schmoll, Bernhard Seiboth, and Christian P. Kubicek	2126–2133
<b>PUBLIC HEALTH MICROBIOLOGY</b>		
<b>Human and Animal Enteric Caliciviruses in Oysters from Different Coastal Regions of the United States</b>	Veronica Costantini, Fabienne Loisy, Lynn Joens, Françoise S. Le Guyader, and Linda J. Saif	1800–1809
<b>Using DNA Microarrays To Identify Library-Independent Markers for Bacterial Source Tracking</b>	Marilyn Soule, Edward Kuhn, Frank Loge, John Gay, and Douglas R. Call	1843–1851
<b>Composition and Dynamics of Bacterial Communities of a Drinking Water Supply System as Assessed by RNA- and DNA-Based 16S rRNA Gene Fingerprinting</b>	Stefan Eichler, Richard Christen, Claudia Höltje, Petra Westphal, Julia Bötzel, Ingrid Brettar, Arndt Mehling, and Manfred G. Höfle	1858–1872
<b>Chromosomal Dynamism in Progeny of Outbreak-Related Sorbitol-Fermenting Enterohemorrhagic <i>Escherichia coli</i> O157:NM</b>	Martina Bielaszewska, Rita Prager, Wenlan Zhang, Alexander W. Friedrich, Alexander Mellmann, Helmut Tschäpe, and Helge Karch	1900–1909

<b>Microbial Communities and Fecal Indicator Bacteria Associated with <i>Cladophora</i> Mats on Beach Sites along Lake Michigan Shores</b>	Ola A. Olapade, Morgan M. Depas, Erika T. Jensen, and Sandra L. McLellan	1932–1938
<b>Inactivation of Single-Celled <i>Ascaris suum</i> Eggs by Low-Pressure UV Radiation</b>	Sarah A. Brownell and Kara L. Nelson	2178–2184
<b>Application of Genotyping during an Extensive Outbreak of Waterborne Giardiasis in Bergen, Norway, during Autumn and Winter 2004</b>	L. J. Robertson, L. Hermansen, B. K. Gjerde, E. Strand, J. O. Alvsvåg, and N. Langeland	2212–2217
<b><i>Cryptosporidium parvum</i> Infections in Bergen, Norway, during an Extensive Outbreak of Waterborne Giardiasis in Autumn and Winter 2004</b>	L. J. Robertson, T. Forberg, L. Hermansen, B. K. Gjerde, J. O. Alvsvåg, and N. Langeland	2218–2220
<b>Analysis of the Clonal Relationship of Shiga Toxin-Producing <i>Escherichia coli</i> Serogroup O165:H25 Isolated from Cattle</b>	Lutz Geue, Thomas Selhorst, Christina Schnick, Birgit Mintel, and Franz J. Conraths	2254–2259
<b>Analysis of Feces Samples Collected from a Wild-Bird Garden Feeding Station in Scotland for the Presence of Verocytotoxin-Producing <i>Escherichia coli</i> O157</b>	Geoffrey Foster, Judith Evans, Hazel I. Knight, Alastair W. Smith, George J. Gunn, Lesley J. Allison, Barti A. Synge, and Tom W. Pennycott	2265–2267
<b>Recovery of <i>Escherichia coli</i> from Soil after Addition of Sterile Organic Wastes</b>	Adrian Unc, Julie Gardner, and Susan Springthorpe	2287–2289
<b>ENVIRONMENTAL MICROBIOLOGY</b>		
<b>Deposition of <i>Cryptosporidium</i> Oocysts in Streambeds</b>	Kristin E. Searcy, Aaron I. Packman, Edward R. Atwill, and Thomas Harter	1810–1816
<b>Enhanced Exopolymer Production and Chromium Stabilization in <i>Pseudomonas putida</i> Unsaturated Biofilms</b>	John H. Priester, Scott G. Olson, Samuel M. Webb, Mary P. Neu, Larry E. Hersman, and Patricia A. Holden	1988–1996
<b>“<i>Candidatus</i> Thiobios zoothamnocoli,” an Ectosymbiotic Bacterium Covering the Giant Marine Ciliate <i>Zoothamnium niveum</i></b>	Christian Rinke, Stephan Schmitz-Esser, Kilian Stoecker, Andrea D. Nussbaumer, Dávid A. Molnár, Katrina Vanura, Michael Wagner, Matthias Horn, Jörg A. Ott, and Monika Bright	2014–2021
<b>Chelator-Induced Dispersal and Killing of <i>Pseudomonas aeruginosa</i> Cells in a Biofilm</b>	Ehud Banin, Keith M. Brady, and E. Peter Greenberg	2064–2069
<b>MICROBIAL ECOLOGY</b>		
<b>Freeze-Thaw Tolerance and Clues to the Winter Survival of a Soil Community</b>	Virginia K. Walker, Gerald R. Palmer, and Gerrit Voordouw	1784–1792
<b>Effect of pH on Isolation and Distribution of Members of Subdivision 1 of the Phylum <i>Acidobacteria</i> Occurring in Soil</b>	Michelle Sait, Kathryn E. R. Davis, and Peter H. Janssen	1852–1857
<b>Unexpected Diversity of Bacteria Capable of Carbon Monoxide Oxidation in a Coastal Marine Environment, and Contribution of the <i>Roseobacter</i>-Associated Clade to Total CO Oxidation</b>	J. D. Tolli, S. M. Sievert, and C. D. Taylor	1966–1973
<b>Bacteriophage Migration via Nematode Vectors: Host-Parasite-Consumer Interactions in Laboratory Microcosms</b>	John J. Dennehy, Nicholas A. Friedenber, Yul W. Yang, and Paul E. Turner	1974–1979
<b>Quantitative PCR Confirms Purity of Strain GT, a Novel Trichloroethene-to-Ethene-Respiring <i>Dehalococcoides</i> Isolate</b>	Youlboong Sung, Kirsti M. Ritalahti, Robert P. Apkarian, and Frank E. Löffler	1980–1987

<b>Selective Removal of DNA from Dead Cells of Mixed Bacterial Communities by Use of Ethidium Monoazide</b>	Andreas Nocker and Anne K. Camper	1997–2004
<b>A Three-Dimensional Computer Model of Four Hypothetical Mechanisms Protecting Biofilms from Antimicrobials</b>	Jason D. Chambless, Stephen M. Hunt, and Philip S. Stewart	2005–2013
<b>Macroscopic Streamer Growths in Acidic, Metal-Rich Mine Waters in North Wales Consist of Novel and Remarkably Simple Bacterial Communities</b>	Kevin B. Hallberg, Kris Coupland, Sakurako Kimura, and D. Barrie Johnson	2022–2030
<b>Sulfide Oxidation Coupled to Arsenate Reduction by a Diverse Microbial Community in a Soda Lake</b>	James T. Hollibaugh, Charles Budinoff, Ryan A. Hollibaugh, Briana Ransom, and Nasreen Bano	2043–2049
<b>Non-Sulfate-Reducing, Syntrophic Bacteria Affiliated with <i>Desulfotomaculum</i> Cluster I Are Widely Distributed in Methanogenic Environments</b>	Hiroyuki Imachi, Yuji Sekiguchi, Yoichi Kamagata, Alexander Loy, Yan-Ling Qiu, Philip Hugenholtz, Nobutada Kimura, Michael Wagner, Akiyoshi Ohashi, and Hideki Harada	2080–2091
<b>Denitrifier Community Composition along a Nitrate and Salinity Gradient in a Coastal Aquifer</b>	Alyson E. Santoro, Alexandria B. Boehm, and Christopher A. Francis	2102–2109
<b>Phylogenetic Analysis and In Situ Identification of <i>Bacteria</i> Community Composition in an Acidic <i>Sphagnum</i> Peat Bog</b>	Svetlana N. Dedysh, Timofei A. Pankratov, Svetlana E. Belova, Irina S. Kulichevskaya, and Werner Liesack	2110–2117
<b>Discovery of a New Source of Rifamycin Antibiotics in Marine Sponge Actinobacteria by Phylogenetic Prediction</b>	Tae Kyung Kim, Amitha K. Hewavitharana, P. Nicholas Shaw, and John A. Fuerst	2118–2125
<b>Concentration-Dependent Patterns of Leucine Incorporation by Coastal Picoplankton</b>	Cecilia Alonso and Jakob Pernthaler	2141–2147
<b>Influence of Freeze-Thaw Stress on the Structure and Function of Microbial Communities and Denitrifying Populations in Soil</b>	Shilpi Sharma, Zsofia Szele, Rolf Schilling, Jean Charles Munch, and Michael Schloter	2148–2154
<b>Diverse and Unique Picocyanobacteria in Chesapeake Bay, Revealed by 16S-23S rRNA Internal Transcribed Spacer Sequences</b>	Feng Chen, Kui Wang, Jinjun Kan, Marcelino T. Suzuki, and K. Eric Wommack	2239–2243
<b>In Situ Gene Expression by <i>Vibrio vulnificus</i></b>	Ben Smith and James D. Oliver	2244–2246
<b>Thermophilic Lifestyle for an Uncultured Archaeon from Hydrothermal Vents: Evidence from Environmental Genomics</b>	Hélène Moussard, Ghislaine Henneke, David Moreira, Vincent Jouffe, Purificacion López-García, and Christian Jeanthon	2268–2271
<b>Synbiotic Microcapsules That Enhance Microbial Viability during Nonrefrigerated Storage and Gastrointestinal Transit</b>	Ross Crittenden, Rangika Weerakkody, Luz Sanguansri, and MaryAnn Augustin	2280–2282
<b>FOOD MICROBIOLOGY</b>		
<b>Survival and Transmission of <i>Salmonella enterica</i> Serovar Typhimurium in an Outdoor Organic Pig Farming Environment</b>	Annette Nygaard Jensen, Anders Dalsgaard, Anders Stockmarr, Eva Møller Nielsen, and Dorte Lau Baggesen	1833–1842
<b>Transcriptional and Functional Analysis of Oxalyl-Coenzyme A (CoA) Decarboxylase and Formyl-CoA Transferase Genes from <i>Lactobacillus acidophilus</i></b>	M. Andrea Azcarate-Peril, Jose M. Bruno-Bárcena, Hosni M. Hassan, and Todd R. Klaenhammer	1891–1899

<b>Supplementation of the Diet with High-Viscosity Beta-Glucan Results in Enrichment for Lactobacilli in the Rat Cecum</b>	Jennifer Snart, Rodrigo Bibiloni, Teresa Grayson, Christophe Lay, Haiyan Zhang, Gwen E. Allison, Julie K. Laverdiere, Feral Temelli, Thavaratnam Vasanthan, Rhonda Bell, and Gerald W. Tannock	1925–1931
<b>Detection of <i>Vibrio parahaemolyticus</i> in Shellfish by Use of Multiplexed Real-Time PCR with TaqMan Fluorescent Probes</b>	Linda N. Ward and Asim K. Bej	2031–2042
<b>Evidence for Distinct L-Methionine Catabolic Pathways in the Yeast <i>Geotrichum candidum</i> and the Bacterium <i>Brevibacterium linens</i></b>	Kenza Arfi, Sophie Landaud, and Pascal Bonnarme	2155–2162
<b>Kinetics of Single Cells: Observation and Modeling of a Stochastic Process</b>	Carmen Pin and József Baranyi	2163–2169
<b>Tolerance of <i>Listeria monocytogenes</i> to Cell Envelope-Acting Antimicrobial Agents Is Dependent on SigB</b>	Máire Begley, Colin Hill, and R. Paul Ross	2231–2234
<b>Casein-Derived Antimicrobial Peptides Generated by <i>Lactobacillus acidophilus</i> DPC6026</b>	M. Hayes, R. P. Ross, G. F. Fitzgerald, C. Hill, and C. Stanton	2260–2264
<b>INVERTEBRATE MICROBIOLOGY</b>		
<b>The Phytopathogen <i>Dickeya dadantii</i> (<i>Erwinia chrysanthemi</i> 3937) Is a Pathogen of the Pea Aphid</b>	Anne-Marie Grenier, Gabrielle Duport, Sylvie Pagès, Guy Condemine, and Yvan Rahbé	1956–1965
<b>METHODS</b>		
<b>In Vivo <i>HimarI</i>-Based Transposon Mutagenesis of <i>Francisella tularensis</i></b>	Tamara M. Maier, Roger Pechous, Monika Casey, Thomas C. Zahrt, and D. W. Frank	1878–1885
<b>Use of Single-Point Genome Signature Tags as a Universal Tagging Method for Microbial Genome Surveys</b>	Daniel van der Lelie, Celine Lesaulnier, Sean McCorkle, Joke Geets, Safiyh Taghavi, and John Dunn	2092–2101
<b>Effect of Transport at Ambient Temperature on Detection and Isolation of <i>Vibrio cholerae</i> from Environmental Samples</b>	Munirul Alam, Abdus Sadique, Nur-A-Hasan, Nurul A. Bhuiyan, G. Balakrish Nair, A. K. Siddique, David A. Sack, Sunjukta Ahsan, Anwar Huq, R. Bradley Sack, and Rita R. Colwell	2185–2190
<b>Evaluation of 23S rRNA PCR Primers for Use in Phylogenetic Studies of Bacterial Diversity</b>	Dana E. Hunt, Vanja Klepac-Ceraj, Silvia G. Acinas, Clement Gautier, Stefan Bertilsson, and Martin F. Polz	2221–2225
<b>Transformation of Rhizobia with Broad-Host-Range Plasmids by Using a Freeze-Thaw Method</b>	Eva Vincze and Steve Bowra	2290–2293
<b>BIODEGRADATION</b>		
<b>Selective Biodegradation of S and N Heterocycles by a Recombinant <i>Rhodococcus erythropolis</i> Strain Containing Carbazole Dioxygenase</b>	Bo Yu, Ping Xu, Shanshan Zhu, Xiaofeng Cai, Ying Wang, Li Li, Fuli Li, Xiaoyong Liu, and Cuiqing Ma	2235–2238
<b>Conversion of <i>Sphingobium chlorophenolicum</i> ATCC 39723 to a Hexachlorobenzene Degradar by Metabolic Engineering</b>	Da-Zhong Yan, Hong Liu, and Ning-Yi Zhou	2283–2286

## EVOLUTIONARY AND GENOMIC MICROBIOLOGY

**Genome Sequence of the Chemolithoautotrophic Nitrite-Oxidizing Bacterium *Nitrobacter winogradskyi* Nb-255**

Shawn R. Starkenburg, Patrick S. G. Chain, Luis A. Sayavedra-Soto, Loren Hauser, Miriam L. Land, Frank W. Larimer, Stephanie A. Malfatti, Martin G. Klotz, Peter J. Bottomley, Daniel J. Arp, and William J. Hickey 2050–2063

**The *atu* and *liu* Clusters Are Involved in the Catabolic Pathways for Acyclic Monoterpenes and Leucine in *Pseudomonas aeruginosa***

J. A. Aguilar, A. N. Zavala, C. Díaz-Pérez, C. Cervantes, A. L. Díaz-Pérez, and J. Campos-García 2070–2079

---

*Cover photograph* (Copyright © 2006, American Society for Microbiology. All Rights Reserved.): Distribution of live (green) and dead (red) cells in a microbial biofilm simulated with a three-dimensional cellular automata model. The yellow background is the substratum. This section shows the predicted pattern of viability in an antimicrobial-treated biofilm, in the layer of cells immediately adjacent to the attachment surface. Among the features captured in this model that are noted in real biofilms are hollow cell clusters, antimicrobial tolerance of biofilm in comparison with the susceptibility of free-floating cells, and nonuniform, stochastic patterns of survival. (See related article on page 2005.)