



AMERICAN  
SOCIETY FOR  
MICROBIOLOGY

Journal of  
Virology®

## CONTENTS • FEBRUARY 2021 • VOLUME 95, NO. 3

### COVER IMAGE



*Cover photograph:* Image of a Townsend's big-eared bat (*Corynorhinus townsendii*). Bats are considered one of the most important reservoirs of zoonotic viruses. We characterized the virome in the guano of several common northern California bat species. Both new and previously described mammalian genomes reported for other bat species were detected. Viruses from local carnivores and rodents, likely contaminating the guano, were also identified. (See related article at [e01713-20](#).) (Copyright © 2021 American Society for Microbiology. All Rights Reserved.)

### EDITORIAL

- The Decision To Publish Gutierrez-Alvarez et al., "Middle East Respiratory Syndrome Coronavirus Gene 5 Modulates Pathogenesis in Mice"** e02118-20

*Mark Heise, Terence S. Dermody, Arturo Casadevall, Rozanne M. Sandri-Goldin, Patrick D. Schloss*

### SPOTLIGHT

- Articles of Significant Interest in This Issue** e02255-20

### STRUCTURE AND ASSEMBLY

- Capsid Structure of *Leishmania* RNA Virus 1** e01957-20

*Michaela Procházková, Tibor Füzik, Danyil Grybchuk, Francesco Luca Falginella, Lucie Podešvová, Vyacheslav Yurchenko, Robert Vácha, Pavel Plevka*

- The SARS-CoV-2 Conserved Macrodomain Is a Mono-ADP-Ribosylhydrolase** e01969-20

*Yousef M. O. Alhammad, Maithri M. Kashipathy, Anuradha Roy, Jean-Philippe Gagné, Peter McDonald, Philip Gao, Louis Nonfoux, Kevin P. Battaile, David K. Johnson, Erik D. Holmstrom, Guy G. Poirier, Scott Lovell, Anthony R. Fehr*

- N-Linked Glycosylation Plays an Important Role in Budding of Neuraminidase Protein and Virulence of Influenza Viruses** e02042-20

*Danqi Bao, Ruixue Xue, Min Zhang, Chenyang Lu, Tianxin Ma, Chaochao Ren, Ting Zhang, Jianmei Yang, Qiaoyang Teng, Xuesong Li, Zejun Li, Qinfang Liu*

- Characterization of Localization and Export Signals of Bovine Torovirus Nucleocapsid Protein Responsible for Extensive Nuclear and Nucleolar Accumulation and Their Importance for Virus Growth** e02111-20

*Makoto Ujike, Yukako Kawachi, Yui Matsunaga, Yuka Etho, Hideki Asanuma, Wataru Kamitani, Fumihito Taguchi*

### GENOME REPLICATION AND REGULATION OF VIRAL GENE EXPRESSION

- cDNA-Derived RNA Phage Assembly Reveals Critical Residues in the Maturation Protein of the *Pseudomonas aeruginosa* Leviphage PP7** e01643-20

*Eun Sook Kim, Jae-Yeol Lee, Chanseop Park, Se-Jeong Ahn, Hee-Won Bae, You-Hee Cho*

- Characterization of Hepatitis B Precore/Core-Related Antigens** e01695-20

*Xupeng Hong, Laurie Luckenbaugh, Megan Mendenhall, Renae Walsh, Liza Cabuang, Sally Soppe, Peter A. Revill, Dara Burdette, Becket Feierbach, William Delaney, Jianming Hu*

## GENETIC DIVERSITY AND EVOLUTION

- A Founder Effect Led Early SARS-CoV-2 Transmission in Spain** e01583-20  
*Francisco Díez-Fuertes, María Iglesias-Caballero, Javier García-Pérez, Sara Monzón, Pilar Jiménez, Sarai Varona, Isabel Cuesta, Ángel Zaballos, Mercedes Jiménez, Laura Checa, Francisco Pozo, Mayte Pérez-Olmeda, Michael M. Thomson, José Alcamí, Inmaculada Casas*
- Virome of Bat Guano from Nine Northern California Roosts** e01713-20  
*Yanpeng Li, Eda Altan, Gabriel Reyes, Brian Halstead, Xutao Deng, Eric Delwart*
- Unexpected Discovery and Expression of Amphibian Class II Endogenous Retroviruses** e01806-20  
*Mingyue Chen, Xiaoxia Guo, Lei Zhang*

## VIRUS-CELL INTERACTIONS

- The Inflammasome Components NLRP3 and ASC Act in Concert with IRGM To Rearrange the Golgi Apparatus during Hepatitis C Virus Infection** e00826-20  
*Coralie F. Daussy, Sarah C. Monard, Coralie Guy, Sara Muñoz-González, Maxime Chazal, Marit W. Anthonsen, Nolwenn Jouvenet, Thomas Henry, Marlène Dreux, Eliane F. Meurs, Marianne Doré Hansen*
- Dual Pathways of Human Immunodeficiency Virus Type 1 Envelope Glycoprotein Trafficking Modulate the Selective Exclusion of Uncleaved Oligomers from Virions** e01369-20  
*Shijian Zhang, Hanh T. Nguyen, Haitao Ding, Jia Wang, Shitao Zou, Lihong Liu, Debjani Guha, Dana Gabuzda, David D. Ho, John C. Kappes, Joseph Sodroski*
- Prohibitin-1 Contributes to Cell-to-Cell Transmission of Herpes Simplex Virus 1 via the MAPK/ERK Signaling Pathway** e01413-20  
*Mizuki Watanabe, Jun Arai, Kosuke Takeshima, Ayano Fukui, Masayuki Shimojima, Hiroko Kozuka-Hata, Masaaki Oyama, Takeharu Minamitani, Teruhito Yasui, Yuji Kubota, Mutsuhiro Takekawa, Isao Kosugi, Yuhei Maruzuru, Naoto Koyanagi, Akihisa Kato, Yasuko Mori, Yasushi Kawaguchi*
- Human Noroviruses Attach to Intestinal Tissues of a Broad Range of Animal Species** e01492-20  
*Nele Villabruna, Claudia M. E. Schapendonk, Georgina I. Aron, Marion P. G. Koopmans, Miranda de Graaf*
- Human Cytomegalovirus Interactions with the Basement Membrane Protein Nidogen 1** e01506-20  
*Man I Kuan, Hannah K. Jaeger, Onesmo B. Balemba, John M. O'Dowd, Deborah Duricka, Holger Hannemann, Emmerentia Marx, Natacha Teissier, Liliana Gabrielli, Maria Paola Bonasoni, Elizabeth M. Keithley, Elizabeth A. Fortunato*
- CD300lf Conditional Knockout Mouse Reveals Strain-Specific Cellular Tropism of Murine Norovirus** e01652-20  
*Vincent R. Graziano, Mia Madel Alfajaro, Cameron O. Schmitz, Renata B. Filler, Madison S. Strine, Jin Wei, Leon L. Hsieh, Megan T. Baldrige, Timothy J. Nice, Sanghyun Lee, Robert C. Orchard, Craig B. Wilen*
- Enterovirus D68 Protease 2A<sup>Pro</sup> Targets TRAF3 To Subvert Host Innate Immune Responses** e01856-20  
*Jun Kang, Zheng Pang, Zhenwei Zhou, Xianhuang Li, Sihua Liu, Jinyan Cheng, Peiyuan Liu, Wenjie Tan, Zhiyun Wang, Tao Wang*

**Chikungunya Virus Replication Rate Determines the Capacity of Crossing Tissue Barriers in Mosquitoes** e01956-20

*Fernando Merwaiss, Claudia V. Filomatori, Yasutsugu Susuki, Eugenia S. Bardossy, Diego E. Alvarez, María-Carla Saleh*

**TRAF6 and TAK1 Contribute to SAMHD1-Mediated Negative Regulation of NF- $\kappa$ B Signaling** e01970-20

*Constanza E. Espada, Corine St. Gelais, Serena Bonifati, Victoria V. Maksimova, Michael P. Cahill, Sun Hee Kim, Li Wu*

**Human Papillomavirus 16 L2 Recruits both Retromer and Retriever Complexes during Retrograde Trafficking of the Viral Genome to the Cell Nucleus** e02068-20

*David Pim, Justyna Broniarczyk, Abida Siddiqa, Paola Massimi, Lawrence Banks*

**CD34<sup>+</sup> Hematopoietic Progenitor Cell Subsets Exhibit Differential Ability To Maintain Human Cytomegalovirus Latency and Persistence** e02105-20

*Lindsey B. Crawford, Meaghan H. Hancock, Hillary M. Struthers, Daniel N. Streblow, Andrew D. Yurochko, Patrizia Caposio, Felicia D. Goodrum, Jay A. Nelson*

**The Vaccinia Virus B12 Pseudokinase Represses Viral Replication via Interaction with the Cellular Kinase VRK1 and Activation of the Antiviral Effector BAF** e02114-20

*Amber B. Rico, Alexandria C. Linville, Annabel T. Olson, Zhigang Wang, Matthew S. Wiebe*

#### CELLULAR RESPONSE TO INFECTION

**Novel Oncolytic Herpes Simplex Virus 1 VC2 Promotes Long-Lasting, Systemic Anti-melanoma Tumor Immune Responses and Increased Survival in an Immunocompetent B16F10-Derived Mouse Melanoma Model** e01359-20

*Ifeanyi Kingsley Uche, Natalie Fowlkes, Luan Vu, Tatiane Watanabe, Mariano Carossino, Rafiq Nabi, Fabio del Piero, Jared S. Rudd, Konstantin G. Kousoulas, Paul J. F. Rider*

**Dissecting Herpes Simplex Virus 1-Induced Host Shutoff at the RNA Level** e01399-20

*Caroline C. Friedel, Adam W. Whisnant, Lara Djakovic, Andrzej J. Rutkowski, Marie-Sophie Friedl, Michael Kluge, James C. Williamson, Somesh Sai, Ramon Oliveira Vidal, Sascha Sauer, Thomas Hennig, Arnhild Grothey, Andrea Milić, Bhupesh K. Prusty, Paul J. Lehner, Nicholas J. Matheson, Florian Erhard, Lars Dölken*

#### VACCINES AND ANTIVIRAL AGENTS

**Identification of an Antiretroviral Small Molecule That Appears To Be a Host-Targeting Inhibitor of HIV-1 Assembly** e00883-20

*Jonathan C. Reed, Dennis Solas, Anatoliy Kitaygorodskyy, Beverly Freeman, Dylan T. B. Ressler, Daryl J. Phuong, J. Victor Swain, Kent Matlack, Clarence R. Hurt, Vishwanath R. Lingappa, Jaisri R. Lingappa*

**A Novel Live Attenuated Respiratory Syncytial Virus Vaccine Candidate with Mutations in the L Protein SAM Binding Site and the G Protein Cleavage Site Is Protective in Cotton Rats and a Rhesus Macaque** e01568-20

*Tiffany Jenkins, Rongzhang Wang, Olivia Harder, Miaoge Xue, Phylip Chen, Jacqueline Corry, Christopher Walker, Michael Teng, Asuncion Mejias, Octavio Ramilo, Stefan Niewiesk, Jianrong Li, Mark E. Peeples*

- Systematic Assessment of Antiviral Potency, Breadth, and Synergy of Triple Broadly Neutralizing Antibody Combinations against Simian-Human Immunodeficiency Viruses** e01667-20  
*Stella J. Berendam, Tiffany M. Styles, Papa K. Morgan-Asiedu, DeAnna Tenney, Amit Kumar, Veronica Obregon-Perko, Katharine J. Bar, Kevin O. Saunders, Sampa Santra, Kristina De Paris, Georgia D. Tomaras, Ann Chahroudi, Sallie R. Permar, Rama R. Amara, Genevieve G. Fouda*
- Effective Inhibition of SARS-CoV-2 Entry by Heparin and Enoxaparin Derivatives** e01987-20  
*Ritesh Tandon, Joshua S. Sharp, Fuming Zhang, Vitor H. Pomin, Nicole M. Ashpole, Dipanwita Mitra, Martin G. McCandless, Weihua Jin, Hao Liu, Poonam Sharma, Robert J. Linhardt*
- A Replication-Defective Influenza Virus Harboring H5 and H7 Hemagglutinins Provides Protection against H5N1 and H7N9 Infection in Mice** e02154-20  
*Xingui Tian, Shelby Landreth, Yao Lu, Kannupriya Pandey, Yan Zhou*
- PATHOGENESIS AND IMMUNITY**
- Middle East Respiratory Syndrome Coronavirus Gene 5 Modulates Pathogenesis in Mice** e01172-20  
*Javier Gutierrez-Alvarez, Li Wang, Raul Fernandez-Delgado, Kun Li, Paul B. McCray, Jr., Stanley Perlman, Isabel Sola, Sonia Zuñiga, Luis Enjuanes*
- Marek's Disease Virus Requires Both Copies of the Inverted Repeat Regions for Efficient *In Vivo* Replication and Pathogenesis** e01256-20  
*Tereza Vychodil, Anelá M. Conradie, Jakob Trimpert, Amr Aswad, Luca D. Bertzbach, Benedikt B. Kaufert*
- Deep Gene Sequence Cluster Analyses of Multi-Virus-Infected Mucosal Tissue Reveal Enhanced Transmission of Acute HIV-1** e01737-20  
*Katja Klein, Immaculate Nankya, Gabrielle Nickel, Annette N. Ratcliff, Adam A. J. Meadows, Nicholas Hathaway, Jeffrey A. Bailey, Daniel J. Stieh, Hannah M. Cheeseman, Ann M. Carias, Michael A. Lobritz, Jamie F. S. Mann, Yong Gao, Thomas J. Hope, Robin J. Shattock, Eric J. Arts*
- Influenza Virus Neuraminidase Engages CD83 and Promotes Pulmonary Injury** e01753-20  
*Ning Ma, Xingjie Li, Hongyu Jiang, Yulong Dai, Guofeng Xu, Zongde Zhang*
- Changes in SARS-CoV-2 Spike versus Nucleoprotein Antibody Responses Impact the Estimates of Infections in Population-Based Seroprevalence Studies** e01828-20  
*Craig Fenwick, Antony Croxatto, Alix T. Coste, Florence Pojer, Cyril André, Céline Pellaton, Alex Farina, Jérémy Campos, David Hacker, Kelvin Lau, Berend-Jan Bosch, Semira Gonseth Nussle, Murielle Bochud, Valerie D'Acromont, Didier Trono, Gilbert Greub, Giuseppe Pantaleo*