



Cover image: Pictured are subadult and juvenile chimpanzees. Edwin J. C. van Leeuwen et al. identified variations in social behavior patterns across neighboring populations of chimpanzees that could not be explained by genetic, ecological, and demographic variations. According to the authors, cultural processes may influence chimpanzee social behavior. See the article by van Leeuwen et al. on pages 11393–11400. Image courtesy of Edwin J. C. van Leeuwen.

From the Cover

- 11393 Chimpanzee social behavior
- 11477 Retrospective belief attribution
- 11561 Gene conflict in plant seeds
- 11579 Adaptive memory of natural killer cells

Contents

THIS WEEK IN PNAS

- 11345 In This Issue

LETTERS (ONLINE ONLY)

- E10516 The preregistration revolution needs to distinguish between predictions and analyses**
Alison Ledgerwood
- E10518 Reply to Ledgerwood: Predictions without analysis plans are inert**
Brian A. Nosek, Charles R. Ebersole, Alexander C. DeHaven, and David T. Mellor
- E10519 Disease status affects the association between rs4813620 and the expression of Alzheimer's disease susceptibility gene *TRIB3***
Guiyou Liu, Shuilin Jin, Yang Hu, and Qinghua Jiang

INNER WORKINGS—An over-the-shoulder look at scientists at work

- 11348 Hunting for microbial life throughout the solar system
Adam Mann

COMMENTARIES

- 11351 Young children flexibly attribute mental states to others
Peter Carruthers
→ See companion article on page 11477
- 11354 Outbreeders pull harder in a parental tug-of-war
Yaniv Brandvain and David Haig
→ See companion article on page 11561
- 11357 Natural killer cells might adapt their inhibitory receptors for memory
Megan A. Cooper
→ See companion article on page 11579

PNAS PLUS

- 11360 Significance Statements
Brief statements written by the authors about the significance of their papers.

SACKLER COLLOQUIUM ON PRESSING QUESTIONS IN THE STUDY OF PSYCHOLOGICAL AND BEHAVIORAL DIVERSITY

INTRODUCTION

- 11366 **Pressing questions in the study of psychological and behavioral diversity**

Daniel J. Hruschka, Douglas L. Medin, Barbara Rogoff, and Joseph Henrich

COLLOQUIUM PAPERS

- 11369 **Differential coding of perception in the world's languages**
Asifa Majid, Seán G. Roberts, Ludy Cilissen, Karen Emmorey, Brenda Nicodemus, Lucinda O'Grady, Bencie Woll, Barbara LeLan, Hilário de Sousa, Brian L. Cansler, Shakila Shayan, Connie de Vos, Gunter Senft, N. J. Enfield, Rogayah A. Razak, Sebastian Fedden, Sylvia Tufvesson, Mark Dingemanse, Ozge Ozturk, Penelope Brown, Clair Hill, Olivier Le Guen, Vincent Hirtzel, Rik van Gijn, Mark A. Sicoli, and Stephen C. Levinson
- 11377 **Sophisticated collaboration is common among Mexican-heritage US children**
Lucía Alcalá, Barbara Rogoff, and Angélica López Fraire
- 11385 **Cultural impediments to learning to cooperate: An experimental study of high- and low-caste men in rural India**
Benjamin A. Brooks, Karla Hoff, and Priyanka Pandey
- 11393 **Population-specific social dynamics in chimpanzees**
Edwin J. C. van Leeuwen, Katherine A. Cronin, and Daniel B. M. Haun
- 11401 **Toward a psychology of *Homo sapiens*: Making psychological science more representative of the human population**
Mostafa Salari Rad, Alison Jane Martingano, and Jeremy Ginges
- 11406 **Expanding the interpretive power of psychological science by attending to culture**
Laura M. Brady, Stephanie A. Fryberg, and Yuichi Shoda
- 11414 **Universality claim of attachment theory: Children's socioemotional development across cultures**
Heidi Keller
- 11420 **Broadening horizons: Sample diversity and socioecological theory are essential to the future of psychological science**
Michael D. Gurven
- 11428 **Learning from failures of protocol in cross-cultural research**
Daniel J. Hruschka, Shirajum Munira, Khaleda Jesmin, Joseph Hackman, and Leonid Tiokhin
- 11435 **Should social scientists be distanced from or engaged with the people they study?**
Kalonji Nzinga, David N. Rapp, Christopher Leatherwood, Matthew Easterday, Leoandra Onnie Rogers, Natalie Gallagher, and Douglas L. Medin

PHYSICAL SCIENCES

APPLIED MATHEMATICS

- E10625 **Epidemiology of the silent polio outbreak in Rahat, Israel, based on modeling of environmental surveillance data**
Andrew F. Brouwer, Joseph N. S. Eisenberg, Connor D. Pomeroy, Lester M. Shulman, Musa Hindiyeh, Yossi Manor, Itamar Grotto, James S. Koopman, and Marisa C. Eisenberg

APPLIED PHYSICAL SCIENCES

- 11442 **Extensile motor activity drives coherent motions in a model of interphase chromatin**
David Saintillan, Michael J. Shelley, and Alexandra Zidovska

BIOPHYSICS AND COMPUTATIONAL BIOLOGY

- 11448 **Physical interactions reduce the power of natural selection in growing yeast colonies**
Andrea Giometto, David R. Nelson, and Andrew W. Murray

CHEMISTRY

- E10521 **Critical computational analysis illuminates the reductive-elimination mechanism that activates nitrogenase for N₂ reduction**
Simone Rauegi, Lance C. Seefeldt, and Brian M. Hoffman
- E10531 **Nonequilibrium associative retrieval of multiple stored self-assembly targets**
Gili Bisker and Jeremy L. England
- 11454 **Self-assembling supramolecular dendrimer nanosystem for PET imaging of tumors**
Philippe Garrigue, Jingjie Tang, Ling Ding, Ahlem Bouhlel, Aura Tintaru, Erik Laurini, Yuanyu Huang, Zhenbin Lyu, Mengjie Zhang, Samantha Fernandez, Laure Balasse, Wenjun Lan, Eric Mas, Domenico Marson, Yuhua Weng, Xiaoxuan Liu, Suzanne Giorgio, Juan Iovanna, Sabrina Pricl, Benjamin Guillet, and Ling Peng
- 11507 **Hierarchical spidroin micellar nanoparticles as the fundamental precursors of spider silks**
Lucas R. Parent, David Onofrei, Dian Xu, Dillan Stengel, John D. Roehling, J. Bennett Addison, Christopher Forman, Samrat A. Amin, Brian R. Cherry, Jeffery L. Yarger, Nathan C. Gianneschi, and Gregory P. Holland

COMPUTER SCIENCES

- 11591 **Deep neural network improves fracture detection by clinicians**
Robert Lindsey, Aaron Daluiski, Sumit Chopra, Alexander Lachapelle, Michael Mozer, Serge Sicular, Douglas Hanel, Michael Gardner, Anurag Gupta, Robert Hotchkiss, and Hollis Potter

EARTH, ATMOSPHERIC, AND PLANETARY SCIENCES

- 11460 **Remote subsurface ocean temperature as a predictor of Atlantic hurricane activity**
Enrico Scoccimarro, Alessio Bellucci, Andrea Storto, Silvio Gualdi, Simona Masina, and Antonio Navarra
- 11465 **Mean precipitation change from a deepening troposphere**
Nadir Jeevanjee and David M. Romps

ENGINEERING

- E10797 **Multiscale effects of heating and cooling on genes and gene networks**
Daniel A. Charlebois, Kevin Hauser, Sylvia Marshall, and Gábor Balázs

ENVIRONMENTAL SCIENCES

- 11543 **Poleward migration of the destructive effects of tropical cyclones during the 20th century**
Jan Altman, Olga N. Ukhvatkina, Alexander M. Omelko, Martin Macek, Tomas Plener, Vit Pejcha, Tomas Cerny, Petr Petrik, Miroslav Srutek, Jong-Suk Song, Alexander A. Zhmerenetsky, Anna S. Vozmishcheva, Pavel V. Krestov, Tatyana Y. Petrenko, Kerstin Treydte, and Jiri Dolezal

SOCIAL SCIENCES

ANTHROPOLOGY

- 11414 **Universality claim of attachment theory: Children's socioemotional development across cultures**
Heidi Keller
- 11428 **Learning from failures of protocol in cross-cultural research**
Daniel J. Hruschka, Shirajum Munira, Khaleida Jesmin, Joseph Hackman, and Leonid Tiokhin

ECONOMIC SCIENCES

- 11385 **Cultural impediments to learning to cooperate: An experimental study of high- and low-caste men in rural India**
Benjamin A. Brooks, Karla Hoff, and Priyanka Pandey
- 11471 **An experimental investigation of preference misrepresentation in the residency match**
Alex Rees-Jones and Samuel Skowronek

PSYCHOLOGICAL AND COGNITIVE SCIENCES

- 11369 **Differential coding of perception in the world's languages**
Asifa Majid, Seán G. Roberts, Ludy Cilissen, Karen Emmorey, Brenda Nicodemus, Lucinda O'Grady, Bencie Woll, Barbara LeLan, Hilário de Sousa, Brian L. Cansler, Shakila Shayan, Connie de Vos, Gunter Senft, N. J. Enfield, Rogayah A. Razak, Sebastian Fedden, Sylvia Tufvesson, Mark Dingemanse, Ozge Ozturk, Penelope Brown, Clair Hill, Olivier Le Guen, Vincent Hirtzel, Rik van Gijn, Mark A. Sicoli, and Stephen C. Levinson
- 11377 **Sophisticated collaboration is common among Mexican-heritage US children**
Lucía Alcalá, Barbara Rogoff, and Angélica López Fraire
- 11393 **Population-specific social dynamics in chimpanzees**
Edwin J. C. van Leeuwen, Katherine A. Cronin, and Daniel B. M. Haun
- 11401 **Toward a psychology of *Homo sapiens*: Making psychological science more representative of the human population**
Mostafa Salari Rad, Alison Jane Martingano, and Jeremy Ginges
- 11406 **Expanding the interpretive power of psychological science by attending to culture**
Laura M. Brady, Stephanie A. Fryberg, and Yuichi Shoda
- 11420 **Broadening horizons: Sample diversity and socioecological theory are essential to the future of psychological science**
Michael D. Gurven
- 11435 **Should social scientists be distanced from or engaged with the people they study?**
Kalonji Nzinga, David N. Rapp, Christopher Leatherwood, Matthew Easterday, Leoandra Onnie Rogers, Natalie Gallagher, and Douglas L. Medin
- 11477 **Retrospective attribution of false beliefs in 3-year-old children**
Ildikó Király, Katalin Oláh, Gergely Csibra, and Ágnes Melinda Kovács

→ See Commentary on page 11351

SOCIAL SCIENCES

- 11483 **Multidimensional measure of immigrant integration**
Niklas Harder, Lucila Figueroa, Rachel M. Gillum, Dominik Hangartner, David D. Laitin, and Jens Hainmueller

SUSTAINABILITY SCIENCE

- 11489 **The demise of caterpillar fungus in the Himalayan region due to climate change and overharvesting**
Kelly A. Hopping, Stephen M. Chignell, and Eric F. Lambin

BIOLOGICAL SCIENCES

AGRICULTURAL SCIENCES

- 11495 **Global trends in infectious diseases of swine**
Kimberly VanderWaal and John Deen

ANTHROPOLOGY

- 11501 **Hominoid intraspecific cranial variation mirrors neutral genetic diversity**
Julia M. Zichello, Karen L. Baab, Kieran P. McNulty, Christopher J. Raxworthy, and Michael E. Steiper

APPLIED BIOLOGICAL SCIENCES

- E10539 **Intestinal barrier dysfunction orchestrates the onset of inflammatory host-microbiome cross-talk in a human gut inflammation-on-a-chip**
Woojung Shin and Hyun Jung Kim
- 11454 **Self-assembling supramolecular dendrimer nanosystem for PET imaging of tumors**
Philippe Garrigue, Jingjie Tang, Ling Ding, Ahlem Bouhleb, Aura Tintaru, Erik Laurini, Yuanyu Huang, Zhenbin Lyu, Mengjie Zhang, Samantha Fernandez, Laure Balasse, Wenjun Lan, Eric Mas, Domenico Marson, Yuhua Weng, Xiaoxuan Liu, Suzanne Giorgio, Juan Iovanna, Sabrina Pricl, Benjamin Guillet, and Ling Peng

BIOCHEMISTRY

- E10548 **Structural and mechanistic insights into the function of the unconventional class XIV myosin MyoA from *Toxoplasma gondii***
Cameron J. Powell, Raghavendran Ramaswamy, Anne Kelsen, David J. Hamelin, David M. Warshaw, Jürgen Bosch, John E. Burke, Gary E. Ward, and Martin J. Boulanger
- E10556 **Arrhythmia mutations in calmodulin cause conformational changes that affect interactions with the cardiac voltage-gated calcium channel**
Kaiqian Wang, Christian Holt, Jocelyn Lu, Malene Brohus, Kamilla Taunsig Larsen, Michael Toft Overgaard, Reinhard Wimmer, and Filip Van Petegem
- E10566 **Small-molecule $Ca_v\alpha_1$ - $Ca_v\beta$ antagonist suppresses neuronal voltage-gated calcium-channel trafficking**
Xingjuan Chen, Degang Liu, Donghui Zhou, Yubing Si, David Xu, Christopher W. Stamatkin, Mona K. Ghozayel, Matthew S. Ripsch, Alexander G. Obukhov, Fletcher A. White, and Samy O. Meroueh
- E10576 **SHOC2-MRAS-PP1 complex positively regulates RAF activity and contributes to Noonan syndrome pathogenesis**
Lucy C. Young, Nicole Hartig, Isabel Boned del Río, Sibel Sari, Benjamin Ringham-Terry, Joshua R. Wainwright, Greg G. Jones, Frank McCormick, and Pablo Rodriguez-Viciano
- 11507 **Hierarchical spidroin micellar nanoparticles as the fundamental precursors of spider silks**
Lucas R. Parent, David Onofrei, Dian Xu, Dillan Stengel, John D. Roehling, J. Bennett Addison, Christopher Forman, Samrat A. Amin, Brian R. Cherry, Jeffery L. Yarger, Nathan C. Gianneschi, and Gregory P. Holland

11513 Pervasive tertiary structure in the dengue virus RNA genome

Elizabeth A. Dethoff, Mark A. Boerneke, Nandan S. Gokhale, Brejnev M. Muhire, Darren P. Martin, Matthew T. Sacco, Michael J. McFadden, Jules B. Weinstein, William B. Messer, Stacy M. Horner, and Kevin M. Weeks

BIOPHYSICS AND COMPUTATIONAL BIOLOGY

E10521 Critical computational analysis illuminates the reductive-elimination mechanism that activates nitrogenase for N₂ reduction

Simone Raugei, Lance C. Seefeldt, and Brian M. Hoffman

E10586 Specificity landscapes unmask submaximal binding site preferences of transcription factors

Devesh Bhimsaria, José A. Rodríguez-Martínez, Junkun Pan, Daniel Roston, Elif Nihal Korkmaz, Qiang Cui, Parameswaran Ramanathan, and Aseem Z. Ansari

E10596 Noncanonical role for the binding protein in substrate uptake by the MetNI methionine ATP Binding Cassette (ABC) transporter

Phong T. Nguyen, Jeffrey Y. Lai, Allen T. Lee, Jens T. Kaiser, and Douglas C. Rees

11519 Dynamic regulation of HIV-1 capsid interaction with the restriction factor TRIM5 α identified by magic-angle spinning NMR and molecular dynamics simulations

Caitlin M. Quinn, Mingzhang Wang, Matthew P. Fritz, Brent Runge, Jinwoo Ahn, Chaoyi Xu, Juan R. Perilla, Angela M. Gronenborn, and Tatyana Polenova

11525 Conformational entropy of a single peptide controlled under force governs protease recognition and catalysis

Marcelo E. Guerin, Guillaume Stirnemann, and David Giganti

CELL BIOLOGY

11531 TRAF4 binds to the juxtamembrane region of EGFR directly and promotes kinase activation

Gang Cai, Liang Zhu, Xing Chen, Kevin Sun, Caini Liu, Ganes C. Sen, George R. Stark, Jun Qin, and Xiaoxia Li

11537 Forces drive basement membrane invasion in *Caenorhabditis elegans*

Rodrigo Cáceres, Nagagireesh Bojanala, Laura C. Kelley, Jes Dreier, John Manzi, Fahima Di Federico, Qiuyi Chi, Thomas Risler, Ilaria Testa, David R. Sherwood, and Julie Plastino

DEVELOPMENTAL BIOLOGY

E10605 *Hox5* genes direct elastin network formation during alveologenesis by regulating myofibroblast adhesion

Steven M. Hrycaj, Leilani Marty-Santos, Cristina Cebrian, Andrew J. Rasky, Catherine Ptaschinski, Nicholas W. Lukacs, and Deneen M. Wellik

E10615 Evolutionarily conserved *Tbx5*–*Wnt2/2b* pathway orchestrates cardiopulmonary development

Jeffrey D. Steimle, Scott A. Rankin, Christopher E. Slagle, Jenna Bekeny, Ariel B. Rydeen, Sunny Sun-Kin Chan, Junghun Kweon, Xinan H. Yang, Kohta Ikegami, Rangarajan D. Nadadur, Megan Rowton, Andrew D. Hoffmann, Sonja Lazarevic, William Thomas, Erin A. T. Boyle Anderson, Marko E. Horb, Luis Luna-Zurita, Robert K. Ho, Michael Kyba, Bjarke Jensen, Aaron M. Zorn, Frank L. Conlon, and Ivan P. Moskowitz

ECOLOGY

11489 The demise of caterpillar fungus in the Himalayan region due to climate change and overharvesting

Kelly A. Hopping, Stephen M. Chignell, and Eric F. Lambin

11543 Poleward migration of the destructive effects of tropical cyclones during the 20th century

Jan Altman, Olga N. Ukhvatkina, Alexander M. Omelko, Martin Macek, Tomas Plener, Vit Pejcha, Tomas Cerny, Petr Petrik, Miroslav Srutek, Jong-Suk Song, Alexander A. Zhmerenetsky, Anna S. Vozmishcheva, Pavel V. Krestov, Tatyana Y. Petrenko, Kerstin Treydte, and Jiri Dolezal

11549 Nonnative plants reduce population growth of an insectivorous bird

Desirée L. Narango, Douglas W. Tallamy, and Peter P. Marra

ENVIRONMENTAL SCIENCES

E10625 Epidemiology of the silent polio outbreak in Rahat, Israel, based on modeling of environmental surveillance data

Andrew F. Brouwer, Joseph N. S. Eisenberg, Connor D. Pomeroy, Lester M. Shulman, Musa Hindiyeh, Yossi Manor, Itamar Grotto, James S. Koopman, and Marisa C. Eisenberg

EVOLUTION

E10634 Species groups distributed across elevational gradients reveal convergent and continuous genetic adaptation to high elevations

Yan-Bo Sun, Ting-Ting Fu, Jie-Qiong Jin, Robert W. Murphy, David M. Hillis, Ya-Ping Zhang, and Jing Che

11448 Physical interactions reduce the power of natural selection in growing yeast colonies

Andrea Giometto, David R. Nelson, and Andrew W. Murray

11555 *Archaeorhynchus* preserving significant soft tissue including probable fossilized lungs

Xiaoli Wang, Jingmai K. O'Connor, John N. Maina, Yanhong Pan, Min Wang, Yan Wang, Xiaoting Zheng, and Zhonghe Zhou

11561 Intersexual conflict over seed size is stronger in more outcrossed populations of a mixed-mating plant

Astrid Raunsgard, Øystein H. Opedal, Runa K. Ekrem, Jonathan Wright, Geir H. Bolstad, W. Scott Armbruster, and Christophe Pélabon

→ See Commentary on page 11354

GENETICS

E10642 BRCA1 ensures genome integrity by eliminating estrogen-induced pathological topoisomerase II–DNA complexes

Hiroyuki Sasanuma, Masataka Tsuda, Suguru Morimoto, Liton Kumar Saha, Md Maminur Rahman, Yusuke Kiyooka, Haruna Fujiike, Andrew D. Chemiack, Junji Itou, Elsa Callen Moreu, Masakazu Toi, Shinichiro Nakada, Hisashi Tanaka, Ken Tsutsui, Shintaro Yamada, Andre Nussenzweig, and Shunichi Takeda

E10652 RNA polymerase II CTD interactome with 3' processing and termination factors in fission yeast and its impact on phosphate homeostasis

Ana M. Sanchez, Stewart Shuman, and Beate Schwer

11567 Coding mutations in *NUS1* contribute to Parkinson's disease

Ji-feng Guo, Lu Zhang, Kai Li, Jun-pu Mei, Jin Xue, Jia Chen, Xia Tang, Lu Shen, Hong Jiang, Chao Chen, Hui Guo, Xue-li Wu, Si-long Sun, Qian Xu, Qi-ying Sun, Piu Chan, Hui-fang Shang, Tao Wang, Guo-hua Zhao, Jing-yu Liu, Xue-feng Xie, Yi-qi Jiang, Zhen-hua Liu, Yu-wen Zhao, Zuo-bin Zhu, Jia-da Li, Zheng-mao Hu, Xin-xiang Yan, Xiao-dong Fang, Guang-hui Wang, Feng-yu Zhang, Kun Xia, Chun-yu Liu, Xiong-wei Zhu, Zhen-yu Yue, Shuai Cheng Li, Huai-bin Cai, Zhuo-hua Zhang, Ran-hui Duan, and Bei-sha Tang

- 11573** Association mapping, transcriptomics, and transient expression identify candidate genes mediating plant–pathogen interactions in a tree
Wellington Muchero, Kelsey L. Sondreli, Jin-Gui Chen, Breeanna R. Urbanowicz, Jin Zhang, Vasanth Singan, Yongil Yang, Robert S. Brueggeman, Juan Franco-Coronado, Nivi Abraham, Jeong-Yeh Yang, Kelley W. Moremen, Alexandra J. Weisberg, Jeff H. Chang, Erika Lindquist, Kerrie Barry, Priya Ranjan, Sara Jawdy, Jeremy Schmutz, Gerald A. Tuskan, and Jared M. LeBoldus

IMMUNOLOGY AND INFLAMMATION

- E10662** Lipoteichoic acid anchor triggers Mincle to drive protective immunity against invasive group A *Streptococcus* infection
Takashi Imai, Takayuki Matsumura, Sabine Mayer-Lambertz, Christine A. Wells, Eri Ishikawa, Suzanne K. Butcher, Timothy C. Barnett, Mark J. Walker, Akihiro Imamura, Hideharu Ishida, Tadayoshi Ikebe, Tomofumi Miyamoto, Manabu Ato, Shouchi Ohga, Bernd Lepenies, Nina M. van Sorge, and Sho Yamasaki
- E10672** Identification and validation of a tumor-infiltrating Treg transcriptional signature conserved across species and tumor types
Angela M. Magnuson, Evgeny Kiner, Ayla Ergun, Jun Seok Park, Natasha Asinowski, Adriana Ortiz-Lopez, Aoife Kilcoyne, Elisa Paoluzzi-Tomada, Ralph Weissleder, Diane Mathis, and Christophe Benoist

- 11579** Critical role for the Ly49 family of class I MHC receptors in adaptive natural killer cell responses
Andrew Wight, Ahmad Bakur Mahmoud, Michal Scur, Megan M. Tu, Mir Munir A. Rahim, Subash Sad, and Andrew P. Makriganis

→ See Commentary on page 11357

- 11585** Paracrine costimulation of IFN- γ signaling by integrins modulates CD8 T cell differentiation
Matthew F. Krummel, Jagdish N. Mahale, Lion F. K. Uhl, Emily A. Hardison, Adriana M. Mujal, Julie M. Mazet, Robert J. Weber, Zev J. Gartner, and Audrey Gérard

MEDICAL SCIENCES

- E10682** Akt-mediated platelet apoptosis and its therapeutic implications in immune thrombocytopenia
Mengxing Chen, Rong Yan, Kangxi Zhou, Xiaodong Li, Yang Zhang, Chunliang Liu, Mengxiao Jiang, Honglei Ye, Xingjun Meng, Ningbo Pang, Lili Zhao, Jun Liu, Weiling Xiao, Renping Hu, Qingya Cui, Wei Zhong, Yunxiao Zhao, Mingqing Zhu, Anning Lin, Changgeng Ruan, and Kesheng Dai
- E10692** Mastocytosis-derived extracellular vesicles exhibit a mast cell signature, transfer KIT to stellate cells, and promote their activation
Do-Kyun Kim, Young-Eun Cho, Hirsh D. Komarow, Geethani Bandara, Byoung-Joon Song, Ana Olivera, and Dean D. Metcalfe
- E10702** Isolation and characterization of NY-ESO-1–specific T cell receptors restricted on various MHC molecules
Michael T. Bethune, Xiao-Hua Li, Jiayi Yu, Jami McLaughlin, Donghui Cheng, Colleen Mathis, Blanca Homet Moreno, Katherine Woods, Ashley J. Knights, Angel Garcia-Diaz, Stephanie Wong, Siwen Hu-Lieskovan, Cristina Puig-Saus, Jonathan Cebon, Antoni Ribas, Lili Yang, Owen N. Witte, and David Baltimore

- 11591** Deep neural network improves fracture detection by clinicians
Robert Lindsey, Aaron Daluiski, Sumit Chopra, Alexander Lachapelle, Michael Mozer, Serge Sicular, Douglas Hanel, Michael Gardner, Anurag Gupta, Robert Hotchkiss, and Hollis Potter

- 11597** Cocaine reward is reduced by decreased expression of receptor-type protein tyrosine phosphatase D (PTPRD) and by a novel PTPRD antagonist
George R. Uhl, Maria J. Martinez, Paul Paik, Agnieszka Sulima, Guo-Hua Bi, Malliga R. Iyer, Eliot Gardner, Kenner C. Rice, and Zheng-Xiong Xi

MICROBIOLOGY

- E10712** Redox, amino acid, and fatty acid metabolism intersect with bacterial virulence in the gut
Reed Pifer, Regan M. Russell, Aman Kumar, Meredith M. Curtis, and Vanessa Sperandio
- 11603** Unraveling the role of B cells in the pathogenesis of an oncogenic avian herpesvirus
Luca D. Bertzbach, Maria Laparidou, Sonja Härtle, Robert J. Etches, Bernd Kaspers, Benjamin Schusser, and Benedikt B. Kaufner
- 11608** Flaviviruses have imperfect icosahedral symmetry
Matthew D. Therkelsen, Thomas Klose, Frank Vago, Wen Jiang, Michael G. Rossmann, and Richard J. Kuhn
- 11613** The mechanism of resistance to favipiravir in influenza
Daniel H. Goldhill, Aartjan J. W. te Velthuis, Robert A. Fletcher, Pinky Langat, Maria Zambon, Angie Lackenby, and Wendy S. Barclay

NEUROSCIENCE

- E10720** Median nerve stimulation induces analgesia via orexin-initiated endocannabinoid disinhibition in the periaqueductal gray
Yi-Hung Chen (陳易宏), Hsin-Jung Lee (李欣蓉), Ming Tatt Lee (李鳴達), Ya-Ting Wu (吳雅婷), Yen-Hsien Lee (李彥賢), Ling-Ling Hwang (黃玲玲), Ming-Shiu Hung (洪明秀), Andreas Zimmer, Ken Mackie, and Lih-Chu Chiou (邱麗珠)
- E10730** Dopamine D2 receptor-mediated circuit from the central amygdala to the bed nucleus of the stria terminalis regulates impulsive behavior
Bokyeong Kim, Sehyoun Yoon, Ryuichi Nakajima, Hyo Jin Lee, Hee Jeong Lim, Yeon-Kyung Lee, June-Seek Choi, Bong-June Yoon, George J. Augustine, and Ja-Hyun Baik
- E10740** Activation of orexin system facilitates anesthesia emergence and pain control
Wei Zhou, Kevin Cheung, Steven Kyu, Lynn Wang, Zhonghui Guan, Philip A. Kurien, Philip E. Bickler, and Lily Y. Jan
- E10748** Coiled-coil structure-dependent interactions between polyQ proteins and Foxo lead to dendrite pathology and behavioral defects
Min Jee Kwon, Myeong Hoon Han, Joshua A. Bagley, Do Young Hyeon, Byung Su Ko, Yun Mi Lee, In Jun Cha, Seung Yeol Kim, Dong Young Kim, Ho Min Kim, Daehee Hwang, Sung Bae Lee, and Yuh Nung Jan
- 11619** Mechanisms underlying contrast-dependent orientation selectivity in mouse V1
Wei P. Dai, Douglas Zhou, David W. McLaughlin, and David Cai
- 11625** Noggin rescues age-related stem cell loss in the brain of senescent mice with neurodegenerative pathology
María Díaz-Moreno, Tomás Armenteros, Simona Gradari, Rafael Hortigüela, Laura García-Corzo, Ángela Fontán-Lozano, José Luis Trejo, and Helena Mira

PHYSIOLOGY

- E10758** Metabolic regulation of female puberty via hypothalamic AMPK–kisspeptin signaling
Juan Roa, Alexia Barroso, Francisco Ruiz-Pino, Maria Jesus Vázquez, Patricia Seoane-Collazo, Noelia Martínez-Sánchez, David García-Galiano, Tuncay Ilhan, Rafael Pineda, Silvia León, Maria Manfredi-Lozano, Violeta Heras, Matti Poutanen, Juan M. Castellano, Francisco Gaytan, Carlos Diéguez, Leonor Pinilla, Miguel López, and Manuel Tena-Sempere

PLANT BIOLOGY

- E10768** **JAZ repressors of metabolic defense promote growth and reproductive fitness in *Arabidopsis***
Qiang Guo, Yuki Yoshida, Ian T. Major, Kun Wang, Koichi Sugimoto, George Kapali, Nathan E. Havko, Christoph Benning, and Gregg A. Howe
- E10778** **ATP compartmentation in plastids and cytosol of *Arabidopsis thaliana* revealed by fluorescent protein sensing**
Chia Pao Voon, Xiaoqian Guan, Yuzhe Sun, Abira Sahu, May Ngor Chan, Per Gardeström, Stephan Wagner, Philippe Fuchs, Thomas Nietzel, Wayne K. Versaw, Markus Schwarzländer, and Boon Leong Lim
- 11631** **COP1 SUPPRESSOR 4 promotes seedling photomorphogenesis by repressing CCA1 and PIF4 expression in *Arabidopsis***
Xianhai Zhao, Yan Jiang, Jian Li, Enamul Huq, Z. Jeffrey Chen, Dongqing Xu, and Xing Wang Deng
- 11637** **Specific recognition of two MAX effectors by integrated HMA domains in plant immune receptors involves distinct binding surfaces**
Liwei Guo, Stella Cesari, Karine de Guillen, Véronique Chalvon, Léa Mammri, Mengqi Ma, Isabelle Meusnier, François Bonnot, André Padilla, You-Liang Peng, Junfeng Liu, and Thomas Kroj

PSYCHOLOGICAL AND COGNITIVE SCIENCES

- 11393** **Population-specific social dynamics in chimpanzees**
Edwin J. C. van Leeuwen, Katherine A. Cronin, and Daniel B. M. Haun
- 11420** **Broadening horizons: Sample diversity and socioecological theory are essential to the future of psychological science**
Michael D. Gurven

SUSTAINABILITY SCIENCE

- E10788** **More than \$1 billion needed annually to secure Africa's protected areas with lions**
Peter A. Lindsey, Jennifer R. B. Miller, Lisanne S. Petracca, Lauren Coad, Amy J. Dickman, Kathleen H. Fitzgerald, Michael V. Flyman, Paul J. Funston, Philipp Henschel, Samuel Kasiki, Kathryn Knights, Andrew J. Loveridge, David W. Macdonald, Roseline L. Mandisodza-Chikerema, Sean Nazerali, Andrew J. Plumptre, Riko Stevens, Hugo W. Van Zyl, and Luke T. B. Hunter

SYSTEMS BIOLOGY

- E10797** **Multiscale effects of heating and cooling on genes and gene networks**
Daniel A. Charlebois, Kevin Hauser, Sylvia Marshall, and Gábor Balázs
- 11643** **Computational and experimental insights into the circadian effects of SIRT1**
Panagiota T. Foteinou, Anand Venkataraman, Lauren J. Francey, Ron C. Anafi, John B. Hogenesch, and Francis J. Doyle III

CORRECTION (ONLINE ONLY)

BIOPHYSICS AND COMPUTATIONAL BIOLOGY

- E10807** **Biophysical and functional characterization of Norrin signaling through Frizzled4**
Injin Bang, Hee Ryung Kim, Andrew H. Beaven, Jinuk Kim, Seung-Bum Ko, Gyu Rie Lee, Hasup Lee, Wonpil Im, Chaok Seok, Ka Young Chung, and Hee-Jung Choi