

**EDUDOC SERVICES**

**CURRENT CONTENTS**

FEBRUARY- 2019



LIBRARY AND DOCUMENTATION DIVISION  
*NATIONAL INSTITUTE OF EDUCATION,*  
**National Council of Educational Research and Training**

Sri Aurobindo Marg, New Delhi-110016

Phone: 011-26863154

Email: [dldi.ncert@gmail.com](mailto:dldi.ncert@gmail.com),

## Introduction

“**Current Contents**” prepared by Library and Documentation Division aims to identify the articles published in the learned journals received by the library in the month of February-2019.

Current Contents are arranged alphabetically under the broad subject headings. It gives the details about the name of the Journal, volume, issue month and year of publication. It will be our endeavour to bring out this as a reference tool, which will make our readers aware about the current contents available in different learned journals of their subject of interest.

Current Contents will be useful to our faculty members in selecting/recommending relevant articles for their research.

Keeping in mind the integration of ICT and Digitisation, attempt has been made to provide the Web-link of the current issues, which will facilitate the readers to access the articles, except the ‘\*’ marked journal titles

We eagerly await to received your views and comments.

(Prof. Saroj Yadav)  
Chairperson, LDD,  
NCERT, New Delhi

Sr. No.	Name of Journals	Vol.	Issue	Month	Year	Pages
<b>Curriculum</b>						
1.	Curriculum Inquiry	48	5	Dec	2018	13
<b>Economics</b>						
2.	Economist	430	9124 9127 9128 9129 9130 9131 9132	5 Jan 26 Jan 2 Feb 9 Feb 16 Feb 23 Feb 2 Mar	2019	20-33
3.	<u>Economic and Political weekly</u>	54	1 2 3 4 5		2019	14-18
4.	Economics of Education Review	68		Feb	2019	19
5.	<u>Journal of Economic Education</u>	49	4	Oct-Dec	2018	53
<b>Educational Psychology</b>						
6.	<u>Educational Psychologist</u>	53	4	Oct-Dec	2018	34
7.	Journal of Educational Psychology	111	1	Jan	2019	54-55
<b>Educational Research</b>						
8.	<u>Australian Journal of Education</u>	62	3	Nov	2018	8--9
9.	<u>Harvard Educational Review</u>	88	4	Winter	2018	38-39
10.	International Journal of Educational Research	85, 86, 91		Sep Dec	2017, 2018	41-45
<b>Educational Technology</b>						
11.	Computers and Education	128		Jan	2019	11-12
<b>Environmental Education</b>						
12.	<u>International Research in Geographical and Environmental Education</u>	27	4	Nov	2018	46
13.	Resurgence & Ecologist		312	Jan/Feb	2019	90-91

<b>Geography</b>						
14.	National Geographic Magazine	6	6 7 8	Jan Feb Mar	2019	71-75
<b>Higher Education</b>						
15.	University News	57	2 3 4 7 8	14 Jan 21 Jan 28 Jan 18 Feb 25 Feb	2018	117-122
<b>Library Science</b>						
16.	SRELS Journal of Information Management	55	6	Dec	2018	114
<b>Linguistics</b>						
17.	ELT Journal	72	4	Oct	2018	36-37
18.	English Teaching Professional		120	Jan	2019	35
19.	<u>Loksanskritam (Sanskrit)</u>	35	1	Feb	2019	56-57
<b>Mathematics Education</b>						
20.	Mathematics Teacher	112	4	Jan-Feb	2019	67
21.	Mathematics Teaching		264	Dec	2018	68
22.	Mathematics Teaching in the Middle School	24	4	Jan-Feb	2019	69-70
23.	<u>Teaching Children Mathematics</u>	25	4	Jan-Feb	2019	115-116
<b>Physics</b>						
24.	American Journal of Physics	87	1 2	Jan Feb	2019	1-4
25.	<u>Physics Today</u>	72	1 2	Jan Feb	2019	81-84
26.	<u>Physics World</u>	32	1 2	Jan Feb	2019	85-86
<b>Psychology</b>						
27.	American Psychologist	74	1	Jan	2019	5-7
28.	<u>Cognitive Psychology</u>	108	-	Feb	2019	10
29.	Journal of Applied Developmental Psychology	60	-	Jan-Feb	2019	48
30.	<u>Journal of Counseling &amp; Development</u>	97	1	Jan	2019	49-50

31.	Journal of Counseling Psychology	66	1	Jan	2019	51-52
<b>Science</b>						
32.	New Scientist	241	3211 3212 3213 3214 3215	5 Jan 12 Jan 19 Jan 26 Jan 2 Feb	2019	76-80
33.	Science	363	6422 6423 6424 6425 6426 6427	4 Jan 11 Jan 18 Jan 25 Jan 1 Feb 8 Feb	2019	94-105
34.	Science Reporter	56	2	Feb	2019	106
<b>Science Education</b>						
35.	<u>Resonance: Journal of Science Education</u>	24	1 2	Jan Feb	2019	88-89
36.	<u>Scientific American</u>	320	1 2	Jan Feb	2019	107-110
37.	<u>School Science Review</u>	100	371	Dec	2018	92-93
<b>Social Science</b>						
38.	<u>International Social Science Journal</u>	67 (225/226)	3-4	Sep-Dec	2017	47
39.	Man and Development *	40	4	Dec	2018	66
40.	Mainstream	57	6 8 9 10	26 Jan 9 Feb 16 Feb 23 Feb	2019	58-65
41.	<u>Seminar</u>		713 714	Jan Feb	2019	111-112
42.	Social Scientist *	46 (546-547)	11-12	Nov-Dec	2018	113
43.	Yojana	63	2	Feb	2019	123
<b>Special Education</b>						
44.	<u>Intellectual and Developmental Disabilities</u>	57	1	Feb	2019	40
45.	Remedial and Special Education	39	6	Dec	2018	87

1

Cover figure: A 650 Hz sound wave is detected by an optical interferometer cavity in an acoustic analog of the LIGO detector. The response on the left shows the greatly enhanced sensitivity if the optical cavity is tuned. For details see the article on p.44.

PAPERS

- 5 Comoving frames and the Lorentz-Fitzgerald contraction *Alon Drory*  
10 Analytical solution of gravity tunnels through an inhomogeneous Earth *Stefan Isermann*  
18 Flying in formation: The orbital dynamics of LISA's three spacecraft *Joseph C. Amato*  
24 Laboratory demonstration of acoustic source localization in two dimensions *Frank Lamelas and Sudha Swaminathan*  
28 Reliable determination of contact angle from the height and volume of sessile drops *F. Behroozi and P. S. Behroozi*  
33 The Fluidyne engine *Alejandro Romanelli*  
38 Observation of the Talbot effect with water waves *Alexandra Bakman, Shmuel Fishman, Mathias Fink, Emmanuel Fort, and Sander Wildeman*

APPARATUS AND DEMONSTRATION NOTES

- 44 LIGO analogy lab—A set of undergraduate lab experiments to demonstrate some principles of gravitational wave detection *Dennis Ugolini, Hanna Rafferty, Max Winter, Carsten Rockstuhl, and Antje Bergmann*

PHYSICS EDUCATION RESEARCH

- 57 Taking teachers' ideas seriously: Exploring the role of physics faculty in preparing teachers in the era of the Next Generation Science Standards *Amy D. Robertson, Lane Seeley, Orlala T. Wentink, and Stamatia Vokos*

**COMPUTATIONAL PHYSICS**

69 **Stability of planetary systems: A numerical didactic approach**

*Renato Pakter  
and Yan Levin*

**BACK OF THE ENVELOPE**

75 **Don't demean the geometric mean**

*Sanjoy Mahajan*

**BOOK REVIEWS**

78 *The Age of Innocence: Nuclear Physics Between the First  
and Second World Wars* by Roger H. Stuewer

*Cameron Reed*

80 **Books Received**

Find your future at  
[aapt.org/  
careercenter](http://aapt.org/careercenter)

**APT**  
PHYSICS EDUCATION

**Career Center** is your resource for  
**physics teaching jobs.**

Cover figure: When the cylinder shown in the top panel is rapidly spun by hand in a certain way, only the "O" marking can be seen, as illustrated in the photograph in lower panel. For details of this and other phenomena involving spinning cylinders and disks see the article on p. 85.

PAPERS

- 85 The mysterious spinning cylinder—Rigid-body motion that is full of surprises  
*David P. Jackson, Julia Huddy, Adam Baldoni, and William Boyes*
- 95 Entangle me! A game to demonstrate the principles of quantum mechanics  
*Andrea López-Incera and Wolfgang Dür*
- 102 Deformation of an inflated bicycle tire when loaded  
*Jordi Renart and Pere Roura-Grabulosa*
- 110 Manual timing in physics experiments: Error and uncertainty  
*David A. Faux and Janet Godolphin*
- 116 Nonlinear effect of forced harmonic oscillator subject to sliding friction and simulation by a simple nonlinear circuit  
*Qian Xu, Wenkai Fan, Yao Luo, Sihui Wang, and Hongjian Jiang*
- 125 Shortcut to stationary regimes: A simple experimental demonstration  
*S. Faure, S. Ciliberto, E. Trizac, and D. Guéry-Odelin*
- 130 On the determination of accelerometer positions within host devices  
*Christopher Isaac Larnder and Brian Larade*
- 136 Modeling the effect of air-intake aperture size in the ping-pong ball cannon  
*Derek J. Thuecks and Harrison A. Demas*
- 141 Energy conservation in explicit solutions as a simple illustration of Noether's theorem  
*Markus Pössel*

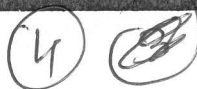
NOTES AND DISCUSSION

- 144 Comment on "Relativistic particle dynamics without relativity"  
[Am. J. Phys. 86, 747–749 (2018)]  
*S. Di Matteo*

ADVANCED TOPICS

- 146 Dipoles in quantum field theory  
*William Miyahira and David C. Latimer*

(Continued)



APPARATUS AND DEMONSTRATION NOTES

153 Electromagnetic field visualization in virtual reality

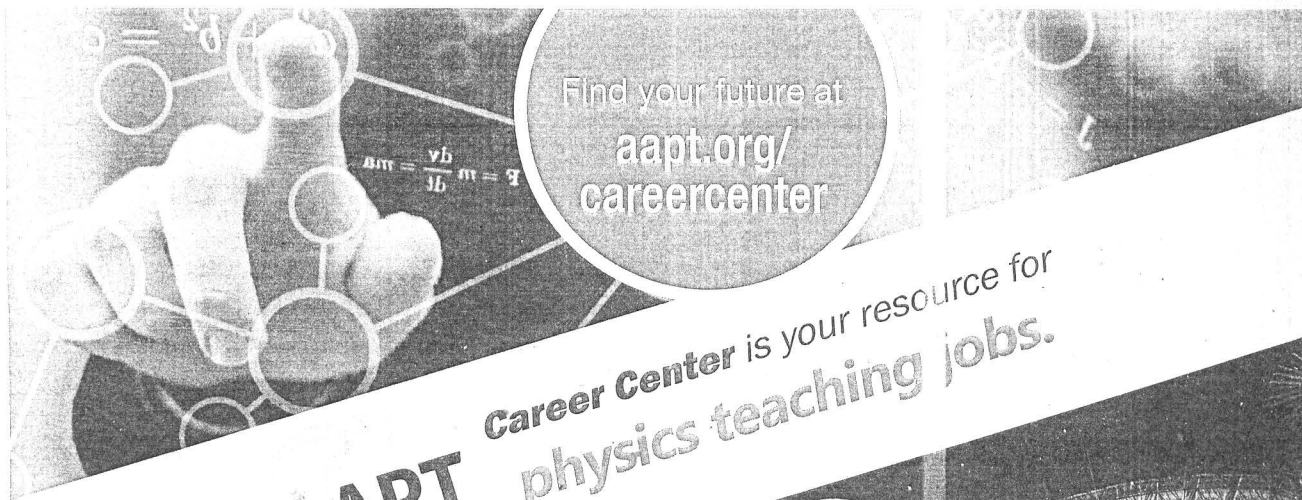
J. Franklin and Andrew Ryder

BOOK REVIEWS

158 *Lost in Math: How Beauty Leads Physics Astray*  
by Sabine Hossenfelder

Moira I. Gresham

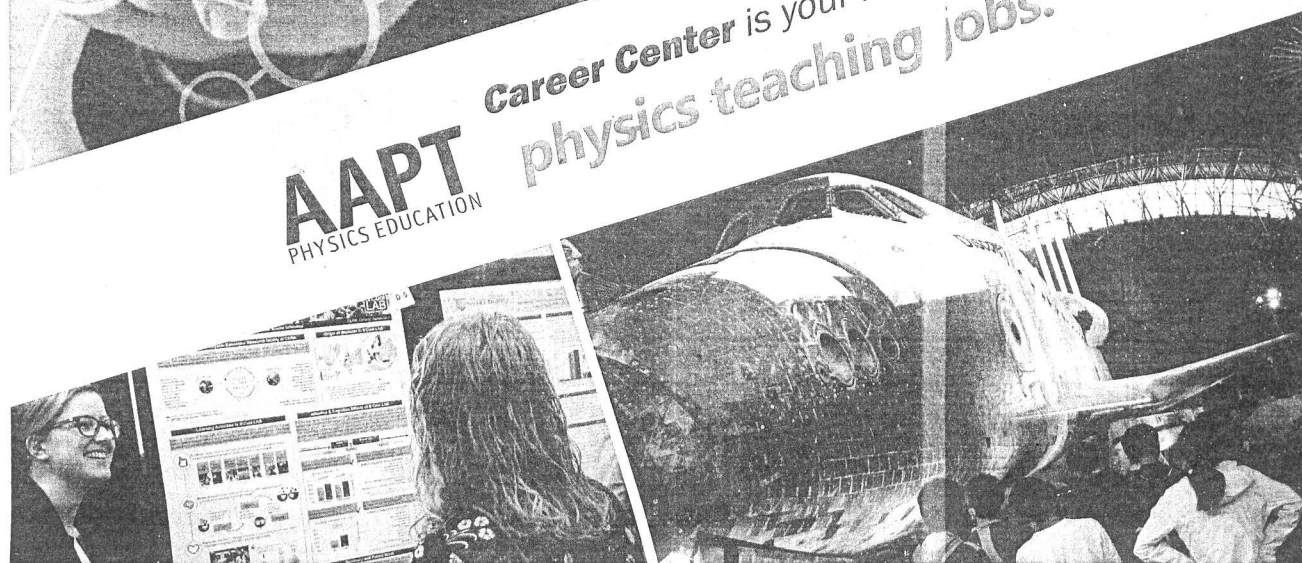
160 Books Received



Find your future at  
[aapt.org/careercenter](http://aapt.org/careercenter)

Career Center is your resource for  
physics teaching jobs.

**AAPT**  
PHYSICS EDUCATION





# AMERICAN PSYCHOLOGIST®

Journal of the American Psychological Association  
<https://www.apa.org/pubs/journals/amp>

© 2019  
American  
Psychological  
Association

*On the cover:* The Healers, 1980, by Helen Hardin (1943–1984) *Tsa-Sah-Wee-Eh (Little Standing Spruce)*. Etching, 5 inches by 6 1/2 inches. Courtesy Adobe Gallery Santa Fe. <https://www.adobegallery.com/>. See p. 161 for more about Hardin and her art.

## Special Issue: Racial Trauma: Theory, Research, and Healing

Special Issue Editors: Lillian Comas-Díaz, Gordon Nagayama Hall, Helen A. Neville, and Anne E. Kazak

- 1 Racial Trauma: Theory, Research, and Healing: Introduction to the Special Issue  
*Lillian Comas-Díaz, Gordon Nagayama Hall, and Helen A. Neville*

People of Color and Indigenous individuals experience racial discrimination in personal, vicarious, and collective ways that affect their physical and mental health. Ongoing exposure to race-based stress is associated with racial trauma. In a climate of pervasive racial discrimination, this introduction to the special issue highlights the importance of documenting the impact of race-based stress on People of Color and Indigenous individuals, as well as the factors that promote healing.

### New Conceptual Models

- 6 American Indian Historical Trauma: Anticolonial Prescriptions for Healing, Resilience, and Survivance  
*William E. Hartmann, Dennis C. Wendt, Rachel L. Burrage, Andrew Pomerville, and Joseph P. Gone*  
As a precursor to racial trauma, the historical trauma concept offers important lessons in efforts to better represent American Indian experiences in the psychological literature. This article considers historical trauma as a clinical condition, life stressor, and critical discourse to inform research programs that promote healing, resilience, and survivance among American Indian peoples.
- 20 The Impact of Historical Trauma on Health Outcomes for Indigenous Populations in the USA and Canada: A Systematic Review  
*Joseph P. Gone, William E. Hartmann, Andrew Pomerville, Dennis C. Wendt, Sarah H. Klem, and Rachel L. Burrage*  
Indigenous people experience persisting inequities in specific mental health conditions, such as alcohol dependence, posttraumatic stress disorder, and suicide. These vulnerabilities are often attributed to indigenous historical trauma stemming from the brutalities of colonization. The authors systematically review the links between historical trauma and adverse health outcomes based on existing research in psychology and related health sciences.
- 36 The Japanese American Wartime Incarceration: Examining the Scope of Racial Trauma  
*Donna K. Nagata, Jacqueline H. J. Kim, and Kaidi Wu*  
In 1942 the U.S. government removed 110,000 Japanese American men, women, and children from their homes and ordered them into desolate incarceration camps, based only on their ethnicity. Two-thirds were American citizens. This article explores the consequences of this powerful race-based historical trauma for Japanese Americans, their coping responses, and their healing mechanisms.

(Contents continue)

- 49 **Healing Ethno-Racial Trauma in Latinx Immigrant Communities: Cultivating Hope, Resistance, and Action**  
*Nayeli Y. Chavez-Dueñas, Hector Y. Adames, Jessica G. Perez-Chavez, and Silvia P. Salas*  
 The United States is a nation of immigrants. While true, this statement belies the violence and oppression that many immigrant populations have endured. Latinx immigrants encounter interlocking systems of oppression and anti-immigration policies, which can lead to psychological distress, including ethno-racial trauma. To engender healing, the authors present a trauma-informed framework and call for psychologists to make psychology a sanctuary discipline.
  
- 63 **RECASTing Racial Stress and Trauma: Theorizing the Healing Potential of Racial Socialization in Families**  
*Riana Elyse Anderson and Howard C. Stevenson*  
 An overwhelming majority of African American youth and adults experience discriminatory racial encounters, which are linked with acute and prolonged stress reactions. Parents use racial socialization to protect their children, but clinical services and traditional coping models have yet to adequately address race-based trauma. The authors propose a theory—Racial Encounter Coping Appraisal and Socialization Theory (RECAST)—that incorporates racial socialization as a competency to mitigate racial stress and build self-efficacy.
  
- 76 **A Model of Cumulative Racial–Ethnic Trauma Among Americans of Middle Eastern and North African (MENA) Descent**  
*Germine H. Awad, Maryam Kia-Keating, and Mona M. Amer*  
 Disparities in health outcomes for ethnic minorities draw attention to the impact of chronic adversity. Many Americans of Middle Eastern and North African (MENA) descent experience repeated episodes of race-based stress and can sustain trauma at the microlevel (e.g., interpersonal discrimination, struggles with recognition and identity) and macrolevel (e.g., institutional prejudice, a hostile national climate). The authors explore these psychological effects with a model of cumulative racial–ethnic trauma.

**Empirical Research**

- 88 **Understanding the Link Between Racial Trauma and Substance Use Among American Indians**  
*Monica C. Skewes and Arthur W. Blume*  
 American Indian and Alaska Native communities experience disparities in health conditions, including a high prevalence of substance use disorders. Extensive research has identified poverty, trauma exposure, and chronic stress as risk factors. To deepen understanding of root causes, the authors conducted in-depth qualitative interviews with 25 American Indian key informants from a frontier reservation in Montana.
  
- 101 **Posttraumatic Stress Disorder in African American and Latinx Adults: Clinical Course and the Role of Racial and Ethnic Discrimination**  
*Nicholas J. Sibrava, Andri S. Bjornsson, A. Carlos I. Pérez Benítez, Ethan Moitra, Risa B. Weisberg, and Martin B. Keller*  
 Research attests that African American and Latinx adults develop posttraumatic stress disorder at higher rates than their White counterparts, often with a poorer clinical course. Both minority groups are beset by racial stressors and sociocultural factors that may contribute to this vulnerability. In a longitudinal study of African American and Latinx adults, the authors examined the course of PTSD, and the previously unexplored relationship between discrimination experiences and PTSD.

## 117 Racial Discrimination and Racial Identity: Daily Moderation Among Black Youth

*Eleanor K. Seaton and Masumi Iida*

Converging evidence indicates that most African American adolescents encounter racial discrimination across various domains. These experiences are linked with youths' psychological distress and declines in well-being at a critical period of identity development. This article reports on an idiographic diary study offering a lens into within-person changes in ethnic-racial identity and how these moderate the link between racial discrimination and depressive symptoms among Black adolescents.

**Challenging Racial Ideologies**

## 128 Disarming Racial Microaggressions: Microintervention Strategies for Targets, White Allies, and Bystanders

*Derald Wing Sue, Sarah Alsaedi, Michael N. Awad, Elizabeth Glaeser, Cassandra Z. Calle, and Narolyn Mendez*

Racial prejudice and discrimination are publicly condemned in society yet persist in the form of interpersonal microaggressions. Individuals of color who are targeted, as well as White allies and bystanders, commonly respond with silence and inaction, which can perpetuate biased behaviors. This article introduces a new framework detailing strategies to address microaggressions that move beyond coping to concrete action and dialogue.

## 143 Racial Trauma, Microaggressions, and Becoming Racially Innocuous: The Role of Acculturation and White Supremacist Ideology

*William Ming Liu, Rossina Zamora Liu, Yunkyoungh Loh Garrison, Ji Youn Cindy Kim, Laurence Chan, Yu C. S. Ho, and Chi W. Yeung*

For many people of color, acculturating to U.S. society involves experiencing pressure to accommodate White cultural expectations. Despite the societal premise of a 'melting pot,' this article sheds light on an implicit White supremacist ideology that underlies acculturation processes. The authors offer research and clinical practice recommendations to raise awareness of the potential for harm in such accommodative processes and interventions to promote healing.

**An Enduring Message**

## 156 The Role of the Behavioral Scientist in the Civil Rights Movement

*Martin Luther King, Jr.*

Dr. Martin Luther King, Jr.'s address in 1967 to the American Psychological Association called for behavioral scientists to draw on our science and intervene to address racial injustice. The article is reprinted from its original publication in *American Psychologist* in 1968 and remains relevant today, inspiring us to work toward a more equitable society.

**Other**

- 162 Announcements
- 168 Calendar
- 169 Instructions to Authors
- 161 On the Cover

## Contents

### Special Issue: Aboriginal and Torres Strait Islander Women of Higher Degree: Standing on the Shoulders of Giants

Guest edited by Melitta Hogarth and Tracey Bunda

<b>Editorial</b>	239
<i>Melitta Hogarth and Tracey Bunda</i>	
<b>Special Issue Articles</b>	
Using bridges made by others as scaffolding and establishing footings for those that follow: Indigenous women in the Academy	243
<i>Bronwyn Fredericks and Nereda White</i>	
Claiming the space, creating the future	256
<i>Sue Green, Jessica Russ-Smith and Lauren Tynan</i>	
Yarning up: Stories of challenges and success	266
<i>Janet Mooney, Lyn Riley and Fabri Blacklock</i>	
Re-imagining Aboriginal leadership in higher education – A new Indigenous research paradigm	276
<i>Linda Payi Ford, Kathy Gotha Guthadjaka, James Walung Daymangu, Bettina Danganbar, Colin Baker, Chloe Ford, Emily Ford, Nicole Thompson, Mark Ford, Ruth Wallace, Marianne St Clair and David Murtagh</i>	
“I wonder what lies beyond that horizon?”	289
<i>Doseena Fergie</i>	

**Visit: [journals.sagepub.com/home/aed](http://journals.sagepub.com/home/aed)**

Free access to tables of contents and abstracts. Site-wide access to the full text for members of subscribing institutions.

Wirrawi Bubuwul – Aboriginal Women Strong  
Michelle Lea Locke

299

**Erratum**

311

*Editorial*

**Edi**

This S  
an an  
(Natio  
would  
celebra  
a colle  
relevan  
efforts

To  
Aborig  
Islands  
commu  
*Aborig*  
*Giants*  
whilst  
mately  
Strait

It w  
the edi  
team c  
instant  
Profess  
by a ca  
publish  
is impc  
be supj  
the Tic  
in this  
positio  
higher  
ness th  
womar  
centric  
to the

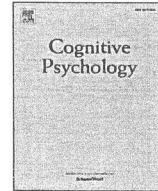


ELSEVIER

Contents lists available at ScienceDirect

# Cognitive Psychology

journal homepage: [www.elsevier.com/locate/cogpsych](http://www.elsevier.com/locate/cogpsych)



## Subscription Articles

### Research Articles

How language and event recall can shape memory for time

**Yaqi Wang, Silvia P. Gennari**

1

Thinking outside of the box II: Disrupting the cognitive map

**Matthew G. Buckley, Alastair D. Smith, Mark Haselgrove**

22

Cancellation, negation, and rejection

**Niels Skovgaard-Olsen, Peter Collins, Karolina Krzyżanowska, Ulrike Hahn, Karl Christoph Klauer**

42

*Cognitive Psychology is covered in Current Contents/Social & Behavioral Sciences, ERIC, PsycINFO Psychological Abstracts; Research Alert and Social Sciences Citation Index. Also covered in the abstract and citation database Scopus®. Full text available on Science-Direct®.*



0010-0285(201902)108:C;1-G

Abstracted/indexed in Cam. Sci. Abstr.; Comput. Cont.; Curr. Cont. CompuMath; Curr. Cont./Soc. & Beh. Sci.; Educ. Tech. Abstr.; ERIC; Clear on Inform. Res.; Info. Sci. Abstr.; PsycINFO.; Res. Alert; Soc. Sci. Cit. Indx; SSSA/CISA/ECA/ISMEC. Also covered in the abstract and citation database SCOPUS®. Full text available on ScienceDirect®.

The role of planning in complex problem solving <b>B. Eichmann, F. Goldhammer, S. Greiff, L. Pucite and J. Naumann</b>	1	An in-depth analysis of adult students in blended environments: Do they regulate their learning in an 'old school' way? <b>S. Vanslambrouck, C. Zhu, B. Pynoo, V. Thomas, K. Lombaerts and J. Tondeur</b>	75
The technology acceptance model (TAM): A meta-analytic structural equation modeling approach to explaining teachers' adoption of digital technology in education <b>R. Scherer, F. Siddiq and J. Tondeur</b>	13	Improving quality of teaching and learning in classes by using augmented reality video <b>J. Yip, S.-H. Wong, K.-L. Yick, K. Chan and K.-H. Wong</b>	88
Learning with multiple online texts as part of scientific inquiry in the classroom <b>S. Sullivan and S. Puntambekar</b>	36	Facilitating professional mobile learning communities with instant messaging <b>C. Pimmer, F. Brühlmann, T.D. Odetola, D.O. Oluwasola, O. Dipeolu and A.J. Ajuwon</b>	102
Learning to code via tablet applications: An evaluation of <i>Daisy the Dinosaur</i> and <i>Kodable</i> as learning tools for young children <b>S. Pila, F. Aladé, K.J. Sheehan, A.R. Lauricella and E.A. Wartella</b>	52	A study on academic staff personality and technology acceptance: The case of communication and collaboration applications <b>C.I. Maican, A.-M. Cazan, R.C. Lixandrioi and L. Dovleac</b>	115
Effects of a mathematics game-based learning environment on primary school students' adaptive number knowledge <b>B. Brezovszky, J. McMullen, K. Veermans, M.M. Hannula-Sormunen, G. Rodríguez-Aflecht, N. Pongsakdi, E. Laakkonen and E. Lehtinen</b>	63	An intelligent diagnostic framework: A scaffolding tool to resolve academic reading problems of Thai first-year university students <b>C. Kaoropthai, O. Natakuatoong and N. Cooharajanone</b>	132

Continued on inside back cover



0360-1315(201901)128:C;1-X



Available online at [www.sciencedirect.com](http://www.sciencedirect.com)

ScienceDirect

ISSN 0360-1315  
128 1-486 (2019)

ELSEVIER

Contents – Continued from outside back cover

Modelling and statistical analysis of YouTube's educational videos: A channel Owner's perspective <b>S. Saurabh and S. Gautam</b>	145	Mediating factors that influence the technology integration practices of teacher educators <b>M.J. Nelson, R. Voithofer and S.-L. Cheng</b>	330
Analyzing students' perceptions to improve the design of an automated assessment tool in online distributed programming <b>T. Daradoumis, J.M. Marquès Puig, M. Arguedas and L. Calvet Liñan</b>	159	Instructors' pointing gestures improve learning regardless of their use of directed gaze in video lectures <b>Z. Pi, Y. Zhang, F. Zhu, K. Xu, J. Yang and W. Hu</b>	345
How pre-service English teachers enact TPACK in the context of web-conferencing teaching: A design thinking approach <b>J.-J. Tseng, Y.-S. Cheng and H.-N. Yeh</b>	171	Supercomputers to improve the performance in higher education: A review of the literature <b>Á. Fernández, C. Fernández, J.Á. Miguel-Dávila, M.Á. Conde and V. Matellán</b>	353
Affordances of using mobile technology to support experience-sampling method in examining college students' engagement <b>K. Xie, B.C. Hedy and B.A. Greene</b>	183	Learning to code or coding to learn? A systematic review <b>S. Popat and L. Starkey</b>	365
How instructors frame students' interactions with educational technologies can enhance or reduce learning with multiple representations <b>S.P.W. Wu, J. Corr and M.A. Rau</b>	199	The influence of instructional design on learner control, sense of achievement, and perceived effectiveness in a supersize MOOC course <b>E. Jung, D. Kim, M. Yoon, S. Park and B. Oakley</b>	377
Effective principles of informal online learning design: A theory-building metasynthesis of qualitative research <b>A.A. Holland</b>	214	Learning to rock: The role of prior experience and explicit instruction on learning and transfer in a music videogame <b>A. Sakkal and L. Martin</b>	389
Technology and writing: Review of research <b>C. Williams and S. Beam</b>	227	Testing the novelty effect of an m-learning tool on internalization and achievement: A Self-Determination Theory approach <b>L.M. Jenó, V. Vandvik, S. Eliassen and J.-A. Grytnes</b>	398
Implementing Facebook-based instructional approach in pre-service teacher education: An empirical investigation <b>C. Saini and J. Abraham</b>	243	College instructors and the digital red pen: An exploratory study of factors influencing the adoption and non-adoption of digital written feedback technologies <b>C.V. Clark-Gordon, N.D. Bowman, A.A. Hadden and B.N. Frisby</b>	414
Investigating learning outcomes and subjective experiences in 360-degree videos <b>M.A. Rupp, K.L. Odette, J. Kozachuk, J.R. Michaelis, J.A. Smither and D.S. McConnell</b>	256	Technology-based reading intervention programs for elementary grades: An analytical review <b>H. Jamshidifarsani, S. Garbaya, T. Lim, P. Blazevic and J.M. Ritchie</b>	427
The impact of a flipped classroom approach on student learning experience <b>I.T. Awidi and M. Paynter</b>	269	Improving collaborative learning: Guiding knowledge exchange through the provision of information about learning partners and learning contents <b>M. Erkens and D. Bodemer</b>	452
Building word knowledge, learning strategies, and metacognition with the Word-Knowledge e-Book <b>C.M. Connor, S.L. Day, E. Zargar, T.S. Wood, K.S. Taylor, M.R. Jones and J.K. Hwang</b>	284	Privacy behavior profiles of underage Facebook users <b>H.-L. Chou, Y.-L. Liu and C. Chou</b>	473
Who is better adapted in learning online within the personal learning environment? Relating gender differences in cognitive attention networks to digital distraction <b>J.-Y. Wu and T. Cheng</b>	312		

# CURRICULUM INQUIRY

13

Vol. 48 No 5

---

## EDITORIAL

Between orders and others  
Rubén Gaztambide-Fernández

Dec. 2018

---

## ARTICLES

Bureaucratization, education and the meanings of responsibility  
Hannah Spector

Differentiating citizenship, criminalizing diversity: Problematizing *convivencia* in education in Spain  
Belén Hernando-Lloréns

Conflict between covers: Confronting official curriculum in Indian textbooks  
Esa Syeed

Undoing exclusions/expanding inclusion: Conceptualizing spaces for gendered learning and citizenship constructions in Myanmar's transition  
Elizabeth J. T. Maber

## LIST OF REVIEWERS

**NDA's Idea of Gender Justice**

7 It will be a mistake to hastily endorse the government's move to pass the triple talaq bill.

**Adding to the GST Conundrum**

8 Can India's goods and services tax progress beyond being an election plank?

**Isn't Unionising Workers a Political Project?**

9 A "non-political" trade union cannot do anything for the beleaguered working class.

**Is the Pathalgadi Movement in Tribal Areas Anti-constitutional?**

10 The Pathalgadi movement has stemmed from the unabated alienation of land from tribal people, and is a democratic assertion for the realisation of their rights. — *Virginus Xaxa*

**A National Law for Urban Trees**

13 A fundamental reform in the law on tree protection is needed, so that it is able to comprehensively protect trees in an urban landscape. — *Ritwick Dutta*

**In the Name of Charity**

17 In the context of the state charity commissioner's intention to ensure compliance with the Indigent Patient Fund scheme, some suggestions have been made for modifying the scheme. — *Shweta Marathe, Indira Chakravarthi*

**Metro Rail Expansion: Implications for Urban Land Use**

20 The evolving policy context of metro rail expansion, the concerns emanating due to public-private partnerships, and their implications for patterns of urban land use are discussed. — *Meenakshi Sinha*

**T N Srinivasan (1933–2018): A Spirited Polymath**

23 T N Srinivasan was one of the most distinguished economists of post-independence India, and contributed immensely to academic research and public policy. — *T S Gopi Rethinaraj*

**What Drives Annual Agricultural Growth Rates in India?**

33 In India, the agricultural growth rate is linked to rainfall, and medium-term growth to technology adoption, policy frameworks, and institutional interventions. — *M Dinesh Kumar, Arijit Ganguly & M V K Sivamohan*

**Social Compliance Audits in Garment Factories**

37 By examining the example of social compliance audits, the trade-off between capital and labour in the global supply chains, and the corroborating demise of workers' rights are analysed. — *Archana Prasad*

**Traders' Participation in Commodity Futures Markets in Kerala**

44 Traders' participation and barriers to participation in commodity futures markets of rubber and pepper in Kerala are explored in the context of increasing debate over the use and benefits of commodity futures markets in India. — *Sumalatha B S*

**The Pyramid of Reporting Domestic Violence in India**

53 The conditions under which incidents of domestic violence are reported and how help is sought through different routes are highlighted using large-scale secondary survey data and primary ethnographic data. — *Suraj Jacob, Sreeparna Chattopadhyay*

**Economic & Political WEEKLY**

**EDITORIALS**

NDA's Idea of Gender Justice.....7  
Adding to the GST Conundrum..... 8  
Isn't Unionising Workers a Political Project?..... 9

**FROM 50 YEARS AGO**.....9

**ALTERNATIVE STANDPOINT**

Is the Pathalgadi Movement in Tribal Areas Anti-constitutional? .....  
—*Virginus Xaxa*..... 10

**COMMENTARY**

A National Law for Urban Trees  
—*Ritwick Dutta* ..... 13  
In the Name of Charity  
—*Shweta Marathe, Indira Chakravarthi* ..... 17  
Metro Rail Expansion: Implications for Urban Land Use  
—*Meenakshi Sinha* ..... 20  
T N Srinivasan (1933–2018): A Spirited Polymath  
—*T S Gopi Rethinaraj*..... 23

**BOOK REVIEWS**

*Waste of a Nation: Garbage and Growth in India—India's Waste Problem: Envisaging a Just Transition*  
—*Aravindhan Nagarajan* ..... 27  
*Population Concerns in India: Shifting Trends, Policies, and Programs—Population Challenges in India*  
—*MD Juel Rana, Srinivas Goli* ..... 29

**PERSPECTIVES**

What Drives Annual Agricultural Growth Rates in India?  
—*M Dinesh Kumar, Arijit Ganguly, M V K Sivamohan* ..... 33

**SPECIAL ARTICLES**

Social Compliance Audits in Garment Factories: The Case of the National Capital Region  
—*Archana Prasad* ..... 37  
Traders' Participation in Commodity Futures Markets in Kerala: A Case Study of Rubber and Pepper Trade  
—*Sumalatha B S* ..... 44  
Speaking of Abuse: The Pyramid of Reporting Domestic Violence in India  
—*Suraj Jacob, Sreeparna Chattopadhyay*..... 53

**CURRENT STATISTICS**..... 63

**APPOINTMENTS/PROGRAMMES**

**ANNOUNCEMENTS**..... 65

**LETTERS** ..... 4

Handwritten notes and stamps at the bottom of the page, including a date stamp '3/1/19' and a signature 'Suraj Jacob'.

**Forbearance over Default: Danger of Misuse**

10 The Reserve Bank of India acceding to demands for a lenient regime of debt restructuring gives rise to suspicions that bad debt, from default by large corporate borrowers, will be restructured at the cost of the taxpayer.  
— *C P Chandrasekhar*

**The Market for Cryptocurrencies: An Ode to F A Hayek**

12 The growing market for cryptocurrencies, viewed through the lens of F A Hayek's idea of abolishing governmental monopoly over currency, reveals fascinating insights. — *Sarthak Gaurav*

**Muzzling Artistic Liberty and Protesting Anti-conversion Bill**

16 The common tropes of Adivasi culture and identity are political constructs and are analysed in light of the response to the book *The Adivasi Will Not Dance: Stories*. — *Sujit Kumar*

**Flaws of Insurance-based Healthcare Provision**

18 The pitfalls of insurance-based provisioning and targeting for public healthcare services are analysed based on Tamil Nadu's experience with healthcare provisioning. — *Gayathri Balagopal, M Vijaybaskar*

**Remembering Mrinal Sen (1923–2018)**

21 Mrinal Sen moved with the crowd, but was a lonely traveller in his journey towards discovering the meaning and potency of cinema.  
— *Amitabha Bhattacharya*

**Testing Times: Standardised Testing in Williamsburg, Virginia**

29 The effects of a standardised testing policy in elementary education—the Standards of Learning followed by Virginia in the United States—on heterogeneous social groups are examined. — *Bhavani Seetharaman*

**Climate Change and Rural Poverty Levels in India**

36 The trends and the role of agricultural growth and other factors in rural poverty have been analysed, and the likely changes under alternative climate scenarios have been assessed. — *K N Ninan*

**Burden of Child Malnutrition in India**

44 Analysing population data at the level of parliamentary constituencies has the potential to bring political accountability to the data-driven policy discourse currently based on district-level estimates. — *Akshay Swaminathan, Rockli Kim, Yun Xu, Jeffrey C Blossom, William Joe, R Venkataramanan, Alok Kumar & S V Subramanian*

**Taking Down Cyber Violence**

53 The precedent set by the Supreme Court on intermediary liability merits critical examination, in order to pave the way forward for developing a balanced intermediate liability regime. — *Amrita Vasudevan*

**Solar Irrigation Pumps and India's Energy-Irrigation Nexus**

62 A response to the discussion article by Meera Sahasranaman et al (2018), "Solar Irrigation Cooperatives: Creating the Frankenstein's Monster for India's Groundwater" (*EPW*, 26 May 2018) — *Shilp Verma, Neha Durga & Tushaar Shah*

**Postscript**

70 *Sreenath V S* on poetry as a mechanism of social conditioning in early India; *Samvartha Sahil* on the political message at the core of the film *Street*; and *Ponnappa* Last Lines by *Ponnappa*.

**Economic & Political WEEKLY**

**EDITORIALS**

Where Will the 10% Be Employed? ..... 7  
Political Production of Shock Absorbers ..... 8  
Ancient India, Modern Science, and Insecurities ... 9

**FROM 50 YEARS AGO** ..... 9

**HT PAREKH FINANCE COLUMN**

Forbearance over Default: Danger of Misuse  
— *C P Chandrasekhar* ..... 10

**COMMENTARY**

The Market for Cryptocurrencies:  
An Ode to F A Hayek  
— *Sarthak Gaurav* ..... 12  
Muzzling Artistic Liberty and Protesting  
Anti-conversion Bill in Jharkhand  
— *Sujit Kumar* ..... 16  
Flaws of Insurance-based Healthcare Provision:  
The Tamil Nadu Healthcare Model  
— *Gayathri Balagopal, M Vijaybaskar* ..... 18  
Remembering Mrinal Sen (1923–2018):  
His Life, Work and Legacy  
— *Amitabha Bhattacharya* ..... 21

**BOOK REVIEWS**

*The RTI Story: Power to the People*—Janne Ka  
Haq: The Struggle for the Right to Information  
— *Shailesh Gandhi* ..... 24  
*Indian Lobbying and Its Influence in US Decision  
Making: Post-Cold War*—Indian Lobbying as a  
Catalyst of US–India Relations  
— *Shailza Singh* ..... 26

**PERSPECTIVES**

Testing Times: Standardised Testing in  
Williamsburg, Virginia  
— *Bhavani Seetharaman* ..... 29

**SPECIAL ARTICLES**

Climate Change and Rural Poverty Levels  
in India  
— *K N Ninan* ..... 36  
Burden of Child Malnutrition in India:  
A View from Parliamentary Constituencies  
— *Akshay Swaminathan, Rockli Kim, Yun Xu,  
Jeffrey C Blossom, William Joe, R Venkataramanan,  
Alok Kumar, S V Subramanian* ..... 44  
Taking Down Cyber Violence: Supreme Court's  
Emerging Stance on Online Censorship and  
Intermediary Liability  
— *Amrita Vasudevan* ..... 53

**DISCUSSION**

Solar Irrigation Pumps and  
India's Energy-Irrigation Nexus  
— *Shilp Verma, Neha Durga, Tushaar Shah* ..... 62

**CURRENT STATISTICS** ..... 67

**POSTSCRIPT**

Symbolic Power of Poetry—*Sreenath V S* (70),  
*Street* and Its Politics—*Samvartha Sahil* (71),  
Last Lines (p 72)

**APPOINTMENTS/PROGRAMMES**

ANNOUNCEMENTS ..... 73

**LETTERS** ..... 4

31/1/19  
पत्रकारिता के  
लिए श्रेष्ठ और प्रेरणादायक  
पत्रिका  
दिल्ली-16

**The City in the Constitution**

10 With growing urbanisation, the problem of democratic deficit in the cities due to panchayati raj institutions or urban local bodies not being sufficiently empowered by the Constitution, is going to become even more acute.  
— *Alok Prasanna Kumar*

**The Constitutional Case against the Citizenship Amendment Bill**

12 The Citizenship (Amendment) Bill passed by the Lok Sabha on 8 January 2019 violates the Constitution because the classification it adopts is manifestly arbitrary and unjustified. — *M Mohsin Alam Bhat*

**The Supreme Court's Death Penalty Focus**

15 The lack of coherence in explaining the significance, meaning, and character of the concept of mitigating factors in the judiciary's sentencing exercises leaves room for subsequent judgments to easily disregard them.  
— *Neetika Vishwanath, Ninni Susan Thomas*

**How Gender-sensitive Are India's Energy Policies?**

18 The two flagship energy policies in India—the Integrated Energy Policy and the National Energy Policy—fail to recognise women's gendered role in production, access to energy, and formulation of energy policies and programmes. — *M Manjula*

**Dynamics of General Strikes**

22 The character of workers' protests has significantly changed in the post-reform period, thanks to the neo-liberal forces that have sought to weaken the collective institutions. — *K R Shyam Sundar*

**She Recovered Many Histories: A Tribute to Aparna Basu**

25 Aparna Basu, who passed away in December 2018, possessed a deep sense of history and a sensitivity to the human spirit which showed in all her multifaceted activities. — *Devaki Jain*

**Land Is Not Soap**

33 It is argued that it is incorrect to apply the widely-used intersecting curves of demand and supply on a graph of price against quantity when trying to understand or explain the market for land. — *Shirish B Patel*

**Financing the Micro and Small Enterprises**

37 The pro-market financial inclusion rhetoric of the second half of the current decade has not helped the MSMES, especially those engaged in manufacturing activities, to enhance access to bank credit. — *Tara Nair, Keshab Das*

**Changing Task Content of Jobs**

44 In India, between 1983 and 2011, non-routine cognitive analytical task intensity jobs increased, as did non-routine cognitive interactive task intensity jobs, in line with the global trend. — *Pankaj Vashisht, Jaydev Dubey*

**Retelling an Epic through a Modern Ballad**

53 The circumstances under which Michael Madhusudan Dutta, the 19th-century Renaissance poet of Bengal, chose the slaying of Ravana's son, Meghnad, as the subject for his magnum opus are examined. — *Nandan Dasgupta*

**Convention on Biological Diversity: Need for a Review**

60 A response to "Critiquing Narrow Critiques of Convention on Biological Diversity" (Alphonsa Jojan et al, 3 November 2018) discusses how the Convention on Biological Diversity puts restrictions on research.  
— *K Divakaran Prathapan, Priyadarsanan Dharma Rajan*

**EDITORIALS**

A Janus-faced Quota ..... 7  
Carving Out the Coasts ..... 8  
BEST under Threat of Privatisation ..... 9

**LAW & SOCIETY**

The City in the Constitution  
— *Alok Prasanna Kumar* ..... 10

**COMMENTARY**

The Constitutional Case against the Citizenship Amendment Bill  
— *M Mohsin Alam Bhat* ..... 12  
The Supreme Court's Death Penalty Focus: Reflections on Sentencing Developments  
— *Neetika Vishwanath, Ninni Susan Thomas* ..... 15  
How Gender-sensitive Are India's Energy Policies?  
— *M Manjula* ..... 18  
Dynamics of General Strikes in India  
— *K R Shyam Sundar* ..... 22  
She Recovered Many Histories: A Tribute to Aparna Basu  
— *Devaki Jain* ..... 25

**BOOK REVIEWS**

*Understanding Women's Land Rights: Gender Discrimination in Ownership*—Access, Ownership, Control: Examining Women's Rights over Land  
— *Padmini Swaminathan* ..... 26  
*Accumulation by Segregation: Muslim Localities in Delhi*—Producing Exclusionary Spaces in Delhi  
— *Geeta Thatra* ..... 28

**PERSPECTIVES**

Land Is Not Soap: Or Why the Usual Demand-Supply Curves Do Not Apply to Land  
— *Shirish B Patel* ..... 33

**SPECIAL ARTICLES**

Financing the Micro and Small Enterprises in India: Antecedents and Emerging Challenges  
— *Tara Nair, Keshab Das* ..... 37  
Changing Task Content of Jobs in India: Implications and the Way Forward  
— *Pankaj Vashisht, Jaydev Dubey* ..... 44  
Retelling an Epic through a Modern Ballad: Michael Madhusudan Dutta's *Meghnādbadh Kāvya*  
— *Nandan Dasgupta* ..... 53

**DISCUSSION**

Convention on Biological Diversity: Need for a Review  
— *K Divakaran Prathapan, Priyadarsanan Dharma Rajan* ..... 60

**CURRENT STATISTICS** ..... 63

**APPOINTMENTS/PROGRAMMES ANNOUNCEMENTS** ..... 65

**LETTERS** ..... 4

**Politics of Contempt?**

7 Members of the *BJP* have been losing their grip on the 2019 election as well as on their tongues.

**Mining into a Death Trap**

8 Recurring deaths in mining holes and manholes put claims of inclusive development at stake.

**Hollowing Out of Judiciary**

8 The judiciary is unable to overcome its problems of arbitrariness and unaccountability.

**The United States Must Come Out of the Mahanian Trap**

10 The American strategy is not able to imagine beyond the Mahanian tenets of sea power to having some money available for building land bridges to interact with Eurasia, as a benign power. — *Atul Bhardwaj*

**The Dark Underbelly of Stardom**

12 Is the Board of Control for Cricket in India overlooking the opportunities that issues like those emerging from the Hardik Pandya controversy provide for creating socially conscious cricketing celebrities? — *Boria Majumdar*

**State of the West Bengal Economy**

15 The GDP estimates of the states based on the problematic new series with 2011–12 base year warrant public scrutiny; the controversial GDP estimates rolled out by West Bengal are analysed. — *Prasenjit Bose*

**The Fifth Schedule of the Constitution: A Critique**

28 The Fifth Schedule's extraordinary legislative and executive gubernatorial powers for governance in Scheduled Areas have hardly been deployed despite the recommendations of various panels. — *Bhupinder Singh*

**'Get Back to Life'**

35 The advertising campaign for one particular emergency contraceptive—i-pill—is analysed to show how contraceptive pharmaceutical advertisements are contradictory in their avowed message and intended aim. — *Nayantara Sheoran Appleton*

**Interventions for Women in Tribal Pockets of Eastern India**

43 A study analysing the reach of health-related schemes for tribal women finds that measures like strengthening nodal agencies, motivational incentives to fieldworkers and organised community involvement, need to be scaled up. — *Vani Sethi, Sourav Bhattacharjee, Sonali Sinha, Abner Daniel, Avinash Lumba, Deepika Sharma & Arti Bhanot*

**Case Study of Mango Production in Karnataka**

52 A case study of the mango value chain and mango farmers in Kolar district of Karnataka analyses the determinants of profitability and constraints faced by the horticulture industry in India. — *Madhuri Saripalle*

**Schooling and the Intra-world of Muslim Community**

60 A narrative of the issues, complexities and challenges that Muslim educational institutions face from within, stresses the need to pay attention to schools as independent institutions. — *Azra Razzack*

**Postscript**

70 *Anu Kumar* on making sense of the question of motherhood; *Sriti Ganguly* on stand-up comedy and how it uses gender stereotypes; and Last Lines by *Ponnappa*.

**EDITORIALS**

Politics of Contempt? ..... 7  
 Mining into a Death Trap ..... 8  
 Hollowing Out of Judiciary ..... 8

**FROM 50 YEARS AGO** ..... 9

**STRATEGIC AFFAIRS**

The United States Must Come Out of the Mahanian Trap  
 — *Atul Bhardwaj* ..... 10

**COMMENTARY**

The Dark Underbelly of Stardom:  
 Hardik Pandya in *Koffee with Karan*  
 — *Boria Majumdar* ..... 12  
 State of the West Bengal Economy:  
 Beyond Aporetic Official Claims  
 — *Prasenjit Bose* ..... 15

**REFEREES CONSULTED IN 2018** ..... 21

**REVIEW ARTICLE**

*Marx at the Margins: On Nationalism, Ethnicity, and Non-Western Societies*—The Other Marx  
 — *Murzban Jal* ..... 22

**PERSPECTIVES**

The Fifth Schedule of the Constitution:  
 A Critique  
 — *Bhupinder Singh* ..... 28

**SPECIAL ARTICLES**

'Get Back to Life': Contradictions in and of  
 Emergency Contraceptive Advertisements in  
 Contemporary India  
 — *Nayantara Sheoran Appleton* ..... 35  
 Delivering Essential Nutrition: Interventions for  
 Women in Tribal Pockets of Eastern India  
 — *Vani Sethi, Sourav Bhattacharjee,  
 Sonali Sinha, Abner Daniel, Avinash Lumba,  
 Deepika Sharma, Arti Bhanot* ..... 43  
 Market Awareness and Profitability:  
 Case Study of Mango Production in Karnataka  
 — *Madhuri Saripalle* ..... 52

**NOTES**

Schooling and the Intra-world of  
 Muslim Community  
 — *Azra Razzack* ..... 60

**CURRENT STATISTICS** ..... 67

**POSTSCRIPT**

'When Will There Be Good News?'  
 — *Anu Kumar (70),  
 Of Stand-up Comedy and Stereotypes*  
 — *Sriti Ganguly (72),  
 Last Lines (72)*

**APPOINTMENTS/PROGRAMMES**

**ANNOUNCEMENTS** ..... 73

**LETTERS** ..... 4

**Opposition Strategy for Uttar Pradesh**

7 Congress's posturing and assertion of distinctness indicate a muddled sense of political priorities.

**Political Dynasty Casts a Shadow on Democracy**

8 Dynastic formation in politics is an underlying recurring paradox of the Indian democracy.

**Climate Change and the Poor**

9 If urgent steps are not taken, climate change will reverse decades of growth in the developing countries.

**Unity in Diversity: Dream and Reality**

10 In giving the maxim—unity in diversity—the generation that fought for independence placed a signpost, signalling the direction we must take.  
—Gurpreet Mahajan

**Compulsory Licensing of Pharmaceutical Patents in India**

12 The trend of continued rejection of compulsory licence applications raises questions about the intervening role of the state in patent monopoly.  
—Prabhat Kuamr Saha, Aditi Mukherjee

**India's Faltering Demand Conditions**

15 The assessment of the major components of aggregate demand and growth rates reveals interesting specifics for an economy that is yet to gain full momentum. —Isha Gupta

**The Nonpareil T N Srinivasan**

21 T N Srinivasan lived up to his beliefs, worked on a wide range of topics, and was an economist like no other. —Kirit S Parikh

**Estimating Public Spending on Health**

30 Using information from Karnataka and Rajasthan, the study highlights the advantages of combining Drawing and Disbursing Officers-level information with budgetary data. —Mita Choudhury, Jay Dev Dubey

**Unqualified Medical Practitioners: Their Illegal but Indispensable Role in Primary Healthcare**

36 The critical facets of medical practice by unqualified medical practitioners in India are explored in this article along with that of a range of actors associated with them. —Shailaja Chandra, Sreedeeep Bhattacharya

**Social Movements and Educational Change: A Case Study of the Adivasi Munnetra Sangam**

45 The case study of Adivasi Munnetra Sangam, a social movement in Gudalur in Tamil Nadu, illustrates how greater inclusion of oppressed groups in education systems can take place. —Amman Madan, Rama Sastry & B Ramdas

**Is India Digitally Prepared for International Trade?**

53 This paper analyses India's digital infrastructure and the value added by digital services to its exports, and assesses its digital preparedness in the context of international trade. —Rashmi Banga

**Economic & Political WEEKLY**

**EDITORIALS**

Opposition Strategy for Uttar Pradesh ..... 7  
Political Dynasty Casts a Shadow on Democracy ..... 8  
Climate Change and the Poor ..... 9

**FROM 50 YEARS AGO** ..... 9

**ALTERNATIVE STANDPOINT**

Unity in Diversity: Dream and Reality  
—Gurpreet Mahajan ..... 10

**COMMENTARY**

Compulsory Licensing of Pharmaceutical Patents in India: A Policy Shift  
—Prabhat Kuamr Saha, Aditi Mukherjee ..... 12  
India's Faltering Demand Conditions  
—Isha Gupta ..... 15  
The Nonpareil T N Srinivasan  
—Kirit S Parikh ..... 21

**REFEREES CONSULTED IN 2018** ..... 23

**BOOK REVIEWS**

*Appointment of Judges to the Supreme Court of India: Transparency, Accountability, and Independence*—Battles to Control the Constitution  
—G Mohan Gopal ..... 24  
*Development-Induced Displacement in India and China: A Comparative Look at the Burdens of Growth*—Displacement and Migration: Comparing China and India  
—Chris de Wet ..... 27

**PERSPECTIVES**

Estimating Public Spending on Health: Using Information on Withdrawals  
—Mita Choudhury, Jay Dev Dubey ..... 30

**SPECIAL ARTICLES**

Unqualified Medical Practitioners: Their Illegal but Indispensable Role in Primary Healthcare  
—Shailaja Chandra, Sreedeeep Bhattacharya ..... 36  
Social Movements and Educational Change: A Case Study of the Adivasi Munnetra Sangam  
—Amman Madan, Rama Sastry, B Ramdas ..... 45  
Is India Digitally Prepared for International Trade?  
—Rashmi Banga ..... 53

**CURRENT STATISTICS** ..... 63

**APPOINTMENTS/PROGRAMMES ANNOUNCEMENTS** ..... 65

**LETTERS** ..... 4

19

Vol. 68

Feb. 2019



ELSEVIER

Available online at [www.sciencedirect.com](http://www.sciencedirect.com)

ScienceDirect

Economics of Education Review 68 (2019)

Economics of  
Education Review

[www.elsevier.com/locate/econedurev](http://www.elsevier.com/locate/econedurev)

## Contents

Achievement gains from reconfiguring early schooling: The case of Brazil's primary education reform <b>Leonardo Rosa, Marcelo Martins and Martin Carnoy</b>		Is the pen mightier than the keyboard? The effect of online testing on measured student achievement <b>Ben Backes and James Cowan</b>	89
Returning special education students to regular classrooms: Externalities on peers' reading scores <b>Beatrice Schindler Rangvid</b>	1	Which New Yorkers vote with their wallets? The impact of teacher quality data on household sorting, and residential and school demographics <b>Elizabeth I. Rivera Rodas</b>	104
The gender gap in K-12 educator salaries <b>Daniel Fox, Michael Gmeiner and Joseph Price</b>	13	Better outcomes without increased costs? Effects of Georgia's University System consolidations <b>Lauren Russell</b>	122
Admission mechanisms and the mismatch between colleges and students: Evidence from a large administrative dataset from China <b>Shiyu Bo, Jing Liu, Ji-Liang Shiu, Yan Song and Sen Zhou</b>	23	The effect of preschool participation on intellectual and behavioral disorder diagnoses: Evidence from surveys on children's health <b>Jessica Monnet</b>	136
Is it good to be LATE? The impact of a preparatory program on upper secondary schooling <b>Jacob Nielsen Arendt, Jane Greve and Mikkel Bergqvist</b>	27	Selective retention bonuses for highly effective teachers in high poverty schools: Evidence from Tennessee <b>Walker A. Swain, Luis A. Rodriguez and Matthew G. Springer</b>	148
The economic impact of universities: Evidence from across the globe <b>Anna Valero and John Van Reenen</b>	38	Building bridges to life after high school: Contemporary career academies and student outcomes <b>Steven W. Hemelt, Matthew A. Lenard and Colleen G. Paeplow</b>	161
The effects of youth transition programs on labor market outcomes of youth with disabilities <b>David Dean, John Pepper, Robert Schmidt and Steven Stern</b>	53		
	68		

Indexed/Abstracted in VOCEDplus: *Journal of Economic Literature* Scopus Social Sciences Citation Index ERIC Econlit Geobase Social SciSearch Uncover Medline Australian Education Index Content Pages in Education Education Research Index Educational Research Abstracts Online Periodicals Index Online Research into Higher Education Abstracts Sociology of Education Abstracts Technical Education & Training Abstracts. Also covered in the abstract and citation database Scopus®. Full text available on ScienceDirect®



ELSEVIER

Available online at [www.sciencedirect.com](http://www.sciencedirect.com)

ScienceDirect

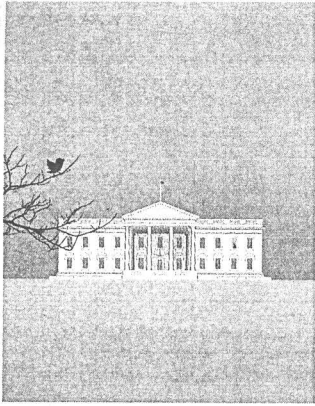


0272-7757(201902)68:C;1-I

ISSN 0272-7757

68 1-178 (2019)

Contents



On the cover

What to expect from the second half of Donald Trump's term: leader, page 7. The era of divided government begins, inauspiciously, page 23. Jim Mattis and John Kelly had little influence on the president but were safeguards against calamity: Lexington, page 27

• Not safe yet; the euro at 20 It needs faster reform if its next 20 years are to be better than its last: leader, page 8. Briefing, page 13

• Flower power in Beijing In the 70th year of Communist rule, China plans to show off every aspect of its growing might. Its anxiety will be evident, too, page 21

• Why the second little pig was right Buildings produce a huge amount of carbon. Using more wood would be greener, page 10. Governments are trying, but mostly failing, to reduce carbon emissions from constructing and using buildings, page 43

• A special report on childhood In just a few decades it has changed out of all recognition. What does that mean for children, parents and society at large? After page 34

The world this week

6 A round-up of political and business news

Leaders

7 The Trump Show Season two

8 The future of Syria Over to you, Vlad

8 The euro at 20 EUR not safe yet

9 Brazil A dangerous populist, with some good ideas

10 Buildings The house made of wood

Letters

11 On Brexit, Donald Trump, banks, hydrocarbons, suicide, MPs

Briefing

13 The euro at 20 Undercooked union

Special report: Childhood

The generation game After page 34



Johnson A selection of words that you can safely toss out of your vocabulary, page 61

Asia

16 Thailand's king

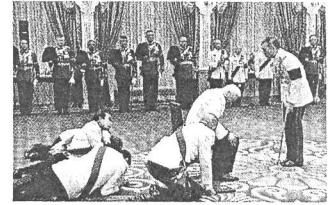
17 Banyan Whaling in Japan

18 A Vietnamese beauty queen

18 War in Afghanistan

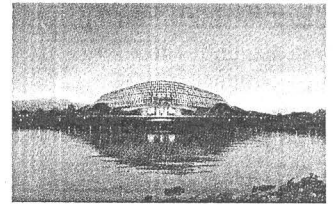
19 Conservation in New Zealand

20 Bangladesh votes



China

21 The biggest flower show ever will celebrate one-party rule



United States

23 When Donny met Nancy

24 The mercurial EPA

24 Grad inflation

25 Warehouse work

26 Somalis in Minnesota

27 Lexington General exit



The Americas

28 Brazil's new president

29 Petro-politics in Guyana

30 Bello "Roma"



Middle East & Africa

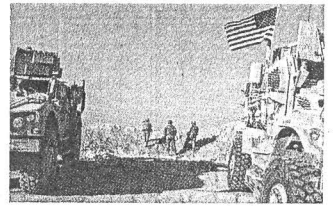
31 America quits Syria

32 Egypt's suffering Copts

33 Israel's split opposition

34 Congo's flawed vote

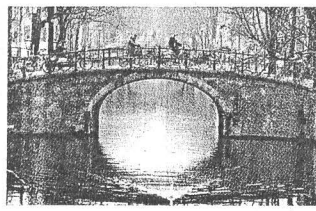
34 To stay or Togo?



Handwritten text in Hindi: '2019 11/11 2019' and a stamp: 'प्रलेखन प्रभाग'.

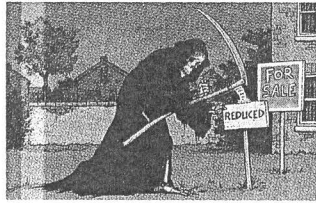
Europe

- 35 Europe's Green parties
- 36 Albanian mobsters
- 37 Selective universities
- 37 Turkey's economy
- 38 Charlemagne The prima donna continent



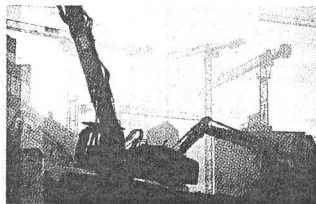
Britain

- 39 Housing and old people
- 40 Crossing the Channel
- 42 Bagehot The politics of patience



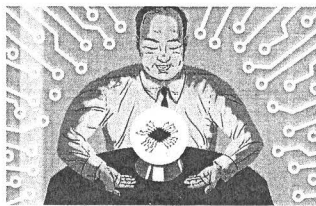
International

- 43 The struggle to make buildings greener



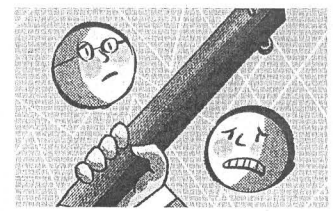
Business

- 45 Arm and chip design
- 46 Bartleby The work treadmill
- 47 Europe's gas supply
- 48 Chinese video games
- 49 Schumpeter Robots in China



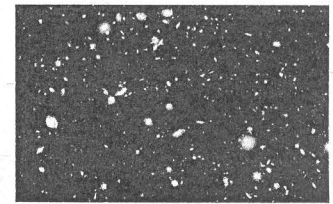
Finance & economics

- 50 Global markets
- 51 Trade deals revamped
- 52 A toast to Burgundy
- 53 MiFID 2 turns one
- 53 Barbarians at the departure gate
- 54 Buttonwood The upside of 2018



Science & technology

- 55 How new instruments will study dark energy, the universe's most mysterious component



Books & arts

- 58 Disney's live-action remakes
- 59 Trinidadian fiction
- 60 Calouste Gulbenkian
- 60 Asia's waterways
- 61 Johnson Defunct words



Economic & financial indicators

- 64 Statistics on 42 economies

Graphic detail

- 65 The failure of gerrymandering

Obituary

- 66 Amos Oz, Israeli writer of novels and essays



Volume 430 Number 9124  
 Published since September 1843 to take part in "a severe contest between intelligence, which presses forward, and an unworthy, timid ignorance obstructing our progress."

Editorial offices in London and also: Amsterdam, Beijing, Berlin, Brussels, Cairo, Chicago, Johannesburg, Madrid, Mexico City, Moscow, Mumbai, New Delhi, New York, Paris, San Francisco, São Paulo, Seoul, Shanghai, Singapore, Tokyo, Washington DC

Subscription service

For our full range of subscription offers, including digital only or print and digital combined, visit: [Economist.com/offers](http://Economist.com/offers)

You can also subscribe by post, telephone or email:

Post: The Economist Subscription Centre, Tanjong Pagar Post Office, P.O. Box 671, Singapore 910817, Republic of Singapore

Telephone: +65 6534 5166

Email: [Asia@subscriptions.economist.com](mailto:Asia@subscriptions.economist.com)

One-year print-only subscription (51 issues):

Australia.....	A \$465
China.....	CNY 2,300
Hong Kong & Macau.....	HK \$2,300
India.....	₹10,000
Japan.....	Yen 44,300
Korea.....	KRW 375,000
Malaysia.....	RM 780
New Zealand.....	NZ \$530
Singapore & Brunei.....	S \$425
Taiwan.....	NT \$9,000
Thailand.....	US \$300
Other countries.....	Contact us as above



PEFC certified  
 This copy of *The Economist* is printed on paper sourced from sustainably managed forests, recycled and controlled sources certified by PEFC  
[www.pefc.org](http://www.pefc.org)

# Contents



### On the cover

Slowbalisation, a new pattern of world commerce is becoming clearer—as are its costs: leader, page 9. Why globalisation faltered, page 17. What to make of China's weakest growth in 28 years, page 66. The euro area is back on the brink of recession: Free exchange, page 72

• **Venezuela erupts** How to hasten the demise of an incompetent dictatorship: leader, page 10. Juan Guaidó has popular support and diplomatic recognition. But Nicolás Maduro still controls the army, page 41

• **How to defend Taiwan** China's growing might is forcing the island to overhaul its military strategy, page 21

• **India's internet tycoon bets big** Thanks mostly to the ambitions of Mukesh Ambani, Indians are getting onto the internet faster than ever, page 59

• **Drones: hovering with intent** Regulators need to encourage drones, but also to protect people from them: leader, page 10. The technology for dealing with rogue drones is getting better, page 75

### The world this week

- 6 A round-up of political and business news

### Leaders

- 9 **Global business** Slowbalisation
- 10 **Venezuela erupts** Removing Maduro
- 10 **Drones** Saviour or menace?
- 11 **Democratic Republic of Congo** The great vote robbery
- 12 **Index funds** Beating the pros

### Letters

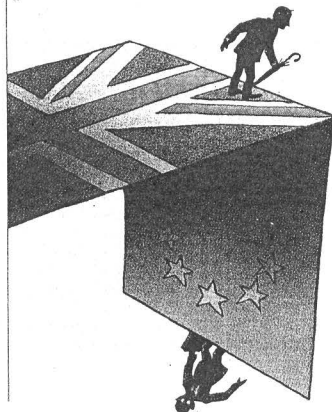
- 14 On housing, Europe, Britain, Pakistan, the military, Chairman Mao

### Briefing

- 17 **Slowbalisation** The global list



**Charlemagne** What Britain and its neighbours misunderstand about each other, page 52



### Asia

- 21 Defending Taiwan
- 22 **Banyan** Asian democracy
- 23 South Korea's judiciary
- 29 Education in India
- 29 Japanese dress codes
- 30 Politics in Afghanistan
- 30 Extremism in Indonesia



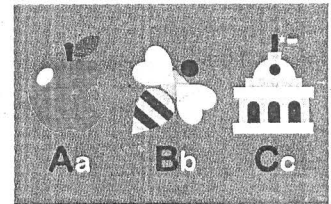
### China

- 31 Belt-and-road students
- 32 Politics and the law
- 34 **Chaguan** Greenery and universal values



### United States

- 35 Young Americans
- 36 Alexandria Ocasio-Cortez
- 37 Riding bulls
- 38 Foxconn in Wisconsin
- 40 **Lexington** Who is winning the shutdown?



### The Americas

- 41 Two presidents for Venezuela
- 42 Guns in Brazil



### Middle East & Africa

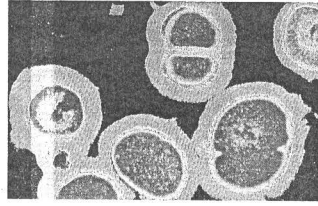
- 43 Netanyahu and the press
- 44 Egypt's new capital
- 45 Repression in Zimbabwe
- 45 A murder in Ghana
- 46 Congo's bogus president



Handwritten signature and date: 1/27/2019  
पलेखन प्रमाण  
आलय और पलेखन प्रमाण  
10 10 10 10 10  
दि. 15

Europe

- 47 Hospital superbugs
- 48 Germany's economy
- 49 Tardy Teutonic trains
- 49 Trying war crimes
- 50 Money-laundering in Malta and Cyprus
- 52 Charlemagne A gulf of misunderstanding



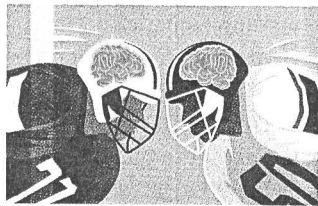
Britain

- 53 The absent agenda
- 54 Parliamentary plotting
- 56 Bagehot Michael Gove, moderate maverick



International

- 57 Protecting athletes from brain injury



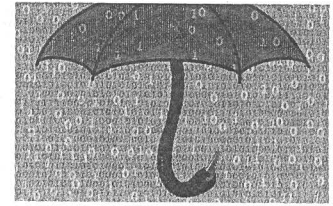
Business

- 59 India's Jeff Bezos?
- 60 The Siemens-Alstom deal
- 61 Bartleby Woke capitalism
- 62 France v Google
- 62 Huawei's woes
- 63 Bike-sharing in China
- 64 Schumpeter Lessons from IKEA



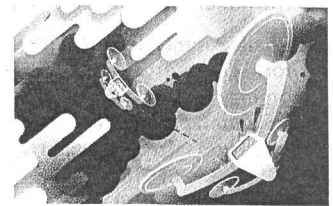
Finance & economics

- 65 Risky cyber-insurance
- 66 China's slowing economy
- 67 Monetary policy in Africa
- 67 Replacing LIBOR
- 68 Cleaning up Italian banks
- 70 Buttonwood Wizedened of Oz
- 71 Fixing the audit market
- 71 The Fed's balance-sheet
- 72 Free exchange #Euroloom



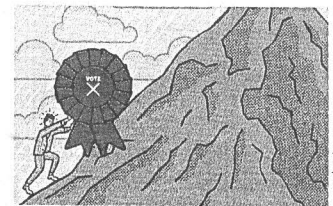
Science & technology

- 75 Defending against drones
- 76 Migrating sea cucumbers
- 77 Fossils and Earth's orbit
- 78 Placebo buttons
- 78 A camera that sees round corners



Books & arts

- 79 Max Weber's wisdom
- 80 Down with Davos Man
- 81 Native American history
- 82 A novel of celebrity
- 82 Snapshots of New York



Economic & financial indicators

- 84 Statistics on 42 economies

Graphic detail

- 85 The cost of studying the arts at Oxbridge

Obituary

- 86 Marcel Azzola, champion of the accordion

The Economist

Volume 430 Number 9127  
 Published since September 1843 to take part in 'a severe contest between intelligence, which presses forward, and an unworthy, timid ignorance obstructing our progress.'

Editorial offices in London and also: Amsterdam, Beijing, Berlin, Brussels, Cairo, Chicago, Johannesburg, Madrid, Mexico City, Moscow, Mumbai, New Delhi, New York, Paris, San Francisco, São Paulo, Seoul, Shanghai, Singapore, Tokyo, Washington DC

Subscription service

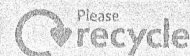
For our full range of subscription offers, including digital only or print and digital combined, visit: [Economist.com/offers](http://Economist.com/offers)

You can also subscribe by post, telephone or email:

Post: **The Economist Subscription Centre, Tanjong Pagar Post Office, P.O. Box 671, Singapore 910817, Republic of Singapore**  
 Telephone: +65 6534 5166  
 Email: [Asia@subscriptions.economist.com](mailto:Asia@subscriptions.economist.com)

One-year print-only subscription (51 issues):

Australia.....	A \$465
China.....	CNY 2,300
Hong Kong & Macau.....	HK \$2,300
India.....	₹10,000
Japan.....	Yen 44,300
Korea.....	KRW 375,000
Malaysia.....	RM 780
New Zealand.....	NZ \$530
Singapore & Brunei.....	S \$425
Taiwan.....	NT \$9,000
Thailand.....	US \$300
Other countries.....	Contact us as above



**PEFC certified**  
 This copy of *The Economist* is printed on paper sourced from sustainably managed forests, recycled and controlled sources certified by PEFC  
[www.pefc.org](http://www.pefc.org)



**On the cover**

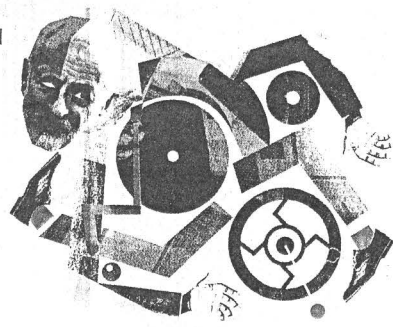
The world's democracies are right to seek change in Latin America's worst-governed country. But their responsibilities go further: leader, *page 9*. A failed revolution may itself be overthrown, *page 17*. How Venezuela's economy can recover from the Maduro regime, *page 19*. Hyperinflations can end quickly: Free exchange, *page 65*

• **How to handle Huawei**  
Banning one of China's leading firms from operating in the West should be a last resort: leader, *page 10*. The tech giant is accused of rewarding trade-secret pilferers on staff, *page 54*

• **Talking to the Taliban** A deal to end the Afghan insurgency would be wonderful—as long as it is not a figleaf to cover an American retreat: leader, *page 10*. Edging towards a peace deal, *page 21*

• **Better ways to tax the rich**  
How to raise money, reduce inequality—and limit the economic damage: leader, *page 12*. The Democratic presidential primary contest is already the most left-wing in decades: Lexington, *page 34*

• **The future of fertility** Thanks to education, global fertility could fall faster than the UN expects, *page 49*



**The world this week**

6 A round-up of political and business news

**Leaders**

- 9 **The battle for Venezuela**  
How to intervene
- 10 **The war in Afghanistan**  
Talking to the Taliban
- 10 **Chinese technology**  
Handling Huawei
- 11 **The Brexit negotiations**  
Over to EU
- 12 **Taxing the rich**  
A way through the warren

**Letters**

- 14 On childhood, science, Wetherspoons, Disney, Chicago

**Briefing**

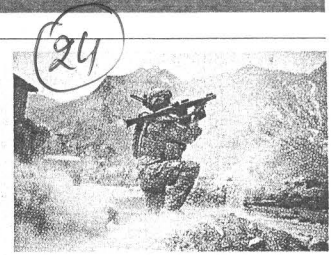
- 17 **Venezuela**  
A chance, at last, for liberation
- 19 **The economy**  
The day after



**Bagehot** Jeremy Corbyn is having a bad Brexit, *page 48*

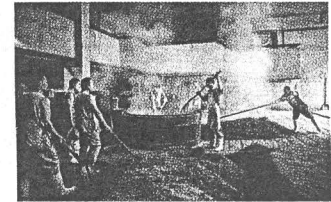
**Asia**

- 21 The war in Afghanistan
- 22 Japan and Naomi Osaka
- 22 Jihad in the Philippines
- 23 Religion in Pakistan
- 23 Sexism in Australia
- 24 **Banyan** In China's debt



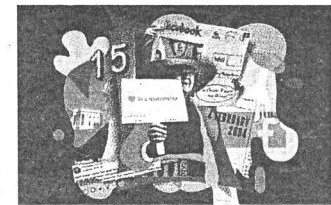
**China**

- 25 Baijiu's global quest
- 28 **Chaguan** The politics of pigs



**United States**

- 29 Facebook and America
- 30 The government is open
- 31 Lasers in space
- 31 Picking a mayor
- 32 Roger Stone
- 34 **Lexington** Democratic populists



**The Americas**

- 35 El Salvador's election
- 36 Brazil's fatal dam disaster
- 36 El Chapo on trial



**Middle East & Africa**

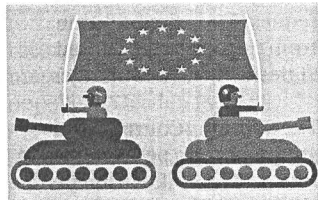
- 37 Africa's smack track
- 38 Pain relief in Africa
- 39 Nigeria's elections
- 39 Lebanon's debt crisis
- 40 The pope in Arabia



25

Europe

- 41 Regional defence
- 42 How the Baltic states resist Russia
- 43 Catalonia's trials
- 43 The marten menace
- 44 The gilets jaunes organise
- 44 A Turkish ghost town
- 45 **Charlemagne** Yanis Varoufakis abroad



Britain

- 46 May's temporary triumph
- 47 Labour's Latin love
- 48 **Bagehot** Jeremy Corbyn's bad Brexit



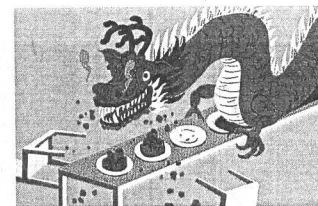
International

- 49 When will humanity shrink?



Business

- 53 The meteoric rise of a Chinese grain trader
- 54 America v Huawei
- 55 **Bartleby** The joy of missing out
- 56 Comcast's Sky deal
- 57 Oleg Deripaska
- 57 Harley-Davidson's woes
- 58 Netflix for video games
- 59 **Schumpeter** A Brazilian mining disaster



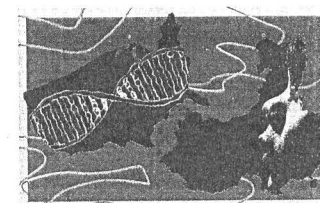
Finance & economics

- 60 Governing e-commerce
- 61 Italy's struggling economy
- 62 Counting dirty money
- 62 Credit-default swaps
- 63 **Buttonwood** Heaven can wait
- 64 Bank mergers in the Gulf
- 64 Banking in Puerto Rico
- 65 **Free exchange** Ending hyperinflation



Science & technology

- 66 Stopping ethics dumping
- 67 An Earth rock on the Moon
- 68 SETI with X-rays
- 68 A new typhoid vaccine
- 69 Did people create pandas?



Books & arts

- 70 Football and politics in Turkey
- 71 Wild Bill Hickok
- 72 Don McCullin's camera
- 73 **Johnson** Learning from mistakes



Economic & financial indicators

- 76 Statistics on 42 economies

Graphic detail

- 77 The "trilemma" of the Israeli-Palestinian conflict

Obituary

- 78 Frank Blaichman, a leader of the Jewish Partisan Army

The Economist

Volume 430 Number 9128

Published since September 1843 to take part in 'a severe contest between intelligence, which presses forward, and an unworthy, timid ignorance obstructing our progress.'

Editorial offices in London and also: Amsterdam, Beijing, Berlin, Brussels, Cairo, Chicago, Johannesburg, Madrid, Mexico City, Moscow, Mumbai, New Delhi, New York, Paris, San Francisco, São Paulo, Seoul, Shanghai, Singapore, Tokyo, Washington DC

Subscription service

For our full range of subscription offers, including digital only or print and digital combined, visit: Economist.com/offers

You can also subscribe by post, telephone or email:

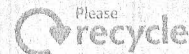
Post: The Economist Subscription Centre, Tanjong Pagar Post Office, P.O. Box 671, Singapore 910817, Republic of Singapore

Telephone: +65 6534 5166

Email: Asia@subscriptions.economist.com

One-year print-only subscription (51 issues):

Australia.....	A \$465
China.....	CNY 2,300
Hong Kong & Macau.....	HK \$2,300
India.....	₹10,000
Japan.....	Yen 44,300
Korea.....	KRW 375,000
Malaysia.....	RM 780
New Zealand.....	NZ \$530
Singapore & Brunei.....	S \$425
Taiwan.....	NT \$9,000
Thailand.....	US \$300
Other countries.....	Contact us as above



PEFC certified This copy of The Economist is printed on paper sourced from sustainably managed forests, recycled and controlled sources certified by PEFC www.pefc.org



On the cover

The oil industry is making a bet that could wreck the climate: leader, page 7. ExxonMobil, a fossil-fuel titan, gambles on growth: Briefing, page 14. The Green New Deal pays little heed to economic orthodoxy: Free exchange, page 63

• Is the German model broken? An economic golden age could be coming to an end: leader, page 8. How Germany's decentralisation can inoculate against political unrest: page 39. The long expansion, page 57

• Iran, 40 years after the revolution The Islamic theocracy has failed its people, but Donald Trump's sanctions could prolong its life: leader, page 9. Four decades after its revolution, Iran is still stuck in the past, page 34

• China's embrace of intellectual property Believe it or not, Chinese firms are not all serial thieves of intellectual property: Schumpeter, page 54

• On the economics of species Conservationists are rethinking how to preserve nature on a changing planet—and within a tight budget, page 64

The world this week

5 A round-up of political and business news

Leaders

- 7 Energy and climate Crude awakening
- 8 Germany's economy Time to worry
- 8 Arms control Death of a nuclear pact
- 9 Iran's revolution at 40 Dealing with the mullahs
- 10 A new boss for the World Bank A qualified pass

Letters

12 On the Democratic Republic of Congo, hygiene, Brexit, chicken, King Crimson, airlines

Briefing

14 ExxonMobil Bigger oil, amid efforts to hold back climate change



Banyan The importance to Shinzo Abe of four alluring islands occupied by Russia, page 20

Asia

- 17 India's Congress party
- 18 Avoiding military service in South Korea
- 19 Turmoil in Thai politics
- 19 Facial fashions in Pakistan
- 20 Banyan Japan's lost islands



China

- 21 Cultural diplomacy
- 22 Pets proliferate
- 24 Chaguan Understanding Taiwan



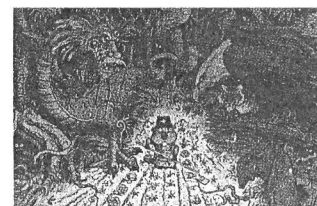
United States

- 25 After the INF treaty
- 26 Missiles and mistrust
- 27 Virginia and shoe polish
- 27 Union shenanigans
- 28 Botox bars
- 29 Elizabeth Warren's ideas
- 30 Lexington Donald Trump and conservatism



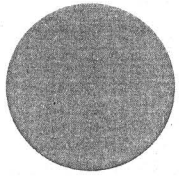
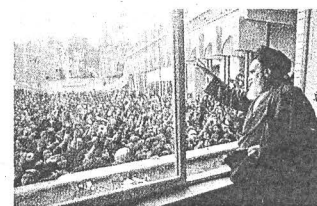
The Americas

- 31 Canada in the global jungle
- 32 Jair Bolsonaro's congressional win
- 33 Bello The Venezuelan dinosaur



Middle East & Africa

- 34 Iran's revolution turns 40
- 36 Iran and its neighbours
- 37 Bibi's favourite word
- 37 East African rifts
- 38 Elections in Nigeria

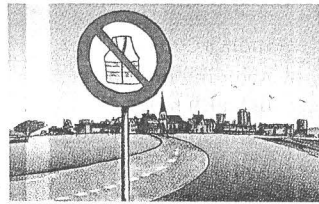


Handwritten signature and date '13/2/19' above a stamp that reads 'प्रलेखन प्रमाण', 'सं. 310 310 310 310', 'मई दिल्ली-16'.

27

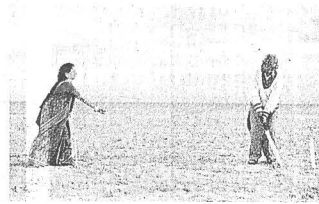
Europe

- 39 No gilets jaunes in Germany
- 40 Macron's great debate
- 41 Phantom fake medicines
- 42 Wish upon Five Stars
- 42 A treadmill for Hungarian dogs
- 43 **Charlemagne** Vestager's progress



Britain

- 44 Asians, the new Europeans
- 45 Irish boom and bust
- 46 **Bagehot** Learning from John Ruskin



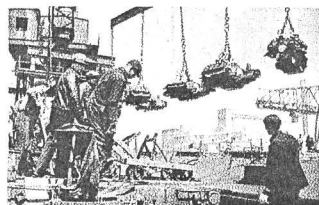
International

- 47 Electricity for the poor
- 48 What light reveals



Business

- 49 America's manufacturing revival
- 50 Intel's new boss
- 51 **Bartleby** McDonald's and sustainability
- 52 UNIQLO abroad
- 52 Norwegian's descent
- 53 Food pricing in France
- 54 **Schumpeter** China and intellectual property



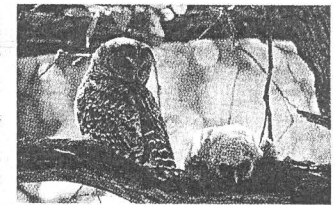
Finance & economics

- 57 Deceleration in Germany
- 58 The first 1MDB trial
- 59 Optimistic pension plans
- 59 Bill Gross retires
- 60 Australia's misbehaving banks
- 60 A bitcoin banker dies
- 61 **Buttonwood** Gauged against the machine
- 62 Donald Trump's tax cuts
- 63 **Free exchange** Brave new deal



Science & technology

- 64 Ecology and economics
- 66 Rewilding spreads



Books & arts

- 67 Eurasia
- 68 An innovative Chinese gallery
- 69 Segregation in America
- 69 A memoir of madness
- 70 Women and the sea



Economic & financial indicators

- 72 Statistics on 42 economies

Graphic detail

- 73 Bitcoin's price crash has not deterred miners

Obituary

- 74 Lamia al-Gailani, guardian of Mesopotamian relics



Volume 430 Number 9129

Published since September 1843 to take part in "a severe contest between intelligence, which presses forward, and an unworthy, timid ignorance obstructing our progress."

Editorial offices in London and also: Amsterdam, Beijing, Berlin, Brussels, Cairo, Chicago, Johannesburg, Madrid, Mexico City, Moscow, Mumbai, New Delhi, New York, Paris, San Francisco, São Paulo, Seoul, Shanghai, Singapore, Tokyo, Washington DC

Subscription service

For our full range of subscription offers, including digital only or print and digital combined, visit: Economist.com/offers

You can also subscribe by post, telephone or email:

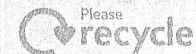
Post: The Economist Subscription Centre, Tanjong Pagar Post Office, P.O. Box 671, Singapore 910817, Republic of Singapore

Telephone: +65 6534 5166

Email: Asia@subscriptions.economist.com

One-year print-only subscription (51 issues):

Australia.....	A \$465
China.....	CNY 2,300
Hong Kong & Macau.....	HK \$2,300
India.....	₹10,000
Japan.....	Yen 44,300
Korea.....	KRW 375,000
Malaysia.....	RM 780
New Zealand.....	NZ \$530
Singapore & Brunei.....	S \$425
Taiwan.....	NT \$9,000
Thailand.....	US \$300
Other countries.....	Contact us as above



PEFC certified This copy of The Economist is printed on paper sourced from sustainably managed forests, recycled and controlled sources certified by PEFC www.pefc.org



On the cover

A new kind of left-wing doctrine is emerging. It is not the answer to capitalism's problems: leader, page 9. Do the radical left's ideas make sense? Page 16. A Finnish trial of universal basic income, page 63

• Turmoil in Thailand The military junta's scheme to manipulate next month's election is back on track after a brief derailment, page 21

• Why the Chinese are so unhappy China has enjoyed unprecedented economic success. A new book examines why its people remain gloomy: Chaguan, page 27

• The beauty of big banks American banking's chunkiest merger since the financial crisis may herald further consolidation, page 57

• Special report: Islam in the West Though both sides remain wary, they are getting closer, after page 40. One of the great religions is experiencing a little-noticed transformation: leader, page 13. The caliphate is nearly dead. Its ideas are not, page 43

The world this week

5 A round-up of political and business news

Leaders

- 9 The resurgent left Millennial socialism
10 Gas and geopolitics Putin's pipeline
12 South Africa Light-bulb moment
12 America's safety-net Don't burden Medicaid
13 The politics of religion Muslims are going native

Letters

14 On the World Bank, Labour, Virginia, vaccinations, John Ruskin, pisco, lifts

Briefing

16 Millennial socialism Life, liberty and the pursuit of property

Special report: Islam in the West

Here to stay After page 40



Free Exchange Imagine a world without Facebook. It might be a better place, page 64

Asia

- 21 A political stitch-up in Thailand
22 American troops in South Korea
22 Suspect Indian statistics
23 Australia v boat people
23 Press freedom in the Philippines
24 Banyan Filipino seafarers



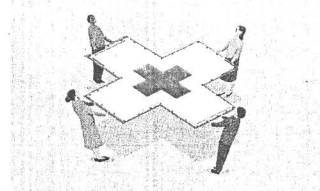
China

- 25 Taking the constitution literally
26 Sci-fi meets foreign policy
27 Chaguan Why the Chinese are sad



United States

- 28 The safety-net
29 The art of the retreat
30 The Democrats and Israel
30 Amy Klobuchar
31 Crime in the Bay Area
32 Lexington The interminable abortion war



The Americas

- 33 Tackling teen pregnancy
34 The Venezuela aid battle
35 Bello A meeting with Sergio Moro



Europe

- 36 Spain's political crisis
37 Nord Stream 2 progresses
38 Threatening Italy's central bank
38 Orban bankrolls babies
39 Protest in Russia
40 Charlemagne Georgia and Europe



Handwritten signature and date 19/2/19, and a stamp: 'बलेखन प्रभाग पुस्तकालय और प्रलेखन प्रभाग दारुणी अ० प्र० प्र० नई दिल्ली-16'

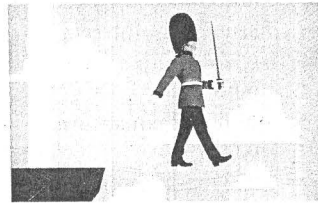
Middle East & Africa

- 41 Saving South Africa
- 42 Jihadists in Nigeria
- 42 France in Chad
- 43 Islamic State's last stand
- 43 Conflict in Libya
- 44 Saudi Arabia's missiles



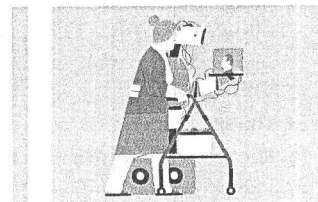
Britain

- 45 The economy since the referendum
- 46 Trade plans run late
- 46 No deal in June?
- 47 Bagehot Lambs to the slaughter



International

- 48 The old need better robots



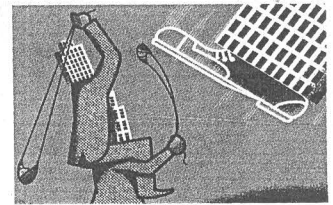
Business

- 51 Bezos v Pecker
- 52 Amazon in New York
- 53 Bartleby Employee surveys ticked
- 54 Jaguar Land Rover's woes
- 54 Renault-Nissan's future
- 55 Beigao goes for gold
- 56 Schumpeter AMLO and business



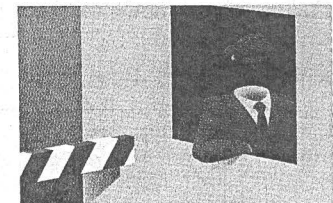
Finance & economics

- 57 At last, a big bank merger
- 58 Buttonwood The case for gold
- 59 China, America and trade
- 59 Bill Gates's annual letter
- 62 Pink jobs and blue jobs
- 63 Finland's basic-income experiment
- 64 Free exchange Imagine a world without Facebook



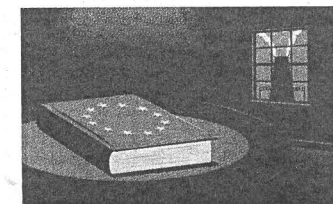
Science & technology

- 66 Making a border invisible
- 67 A new prion disease?
- 68 Driving with no brakes
- 69 Debitting olives



Books & arts

- 70 A novel of the EU
- 71 Basque poetry slams
- 72 The Amritsar massacre
- 72 A shadow over Test cricket
- 73 Johnson Truth and talk



Economic & financial indicators

- 76 Statistics on 42 economies

Graphic detail

- 77 First names and individualism in 19th-century migrants

Obituary

- 78 James McManus, the last of New York's Tammany-style bosses

The Economist

Volume 430 Number 9130

Published since September 1843 to take part in "a severe contest between intelligence, which presses forward, and an unworthy, timid ignorance obstructing our progress."

Editorial offices in London and also: Amsterdam, Beijing, Berlin, Brussels, Cairo, Chicago, Johannesburg, Madrid, Mexico City, Moscow, Mumbai, New Delhi, New York, Paris, San Francisco, São Paulo, Seoul, Shanghai, Singapore, Tokyo, Washington DC

Subscription service

For our full range of subscription offers, including digital only or print and digital combined, visit: Economist.com/offers

You can also subscribe by post, telephone or email:

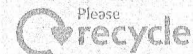
Post: The Economist Subscription Centre, Tanjong Pagar Post Office, P.O. Box 671, Singapore 910817, Republic of Singapore

Telephone: +65 6534 5166

Email: Asia@subscriptions.economist.com

One-year print-only subscription (51 issues):

Australia.....	A \$465
China.....	CNY 2,300
Hong Kong & Macau.....	HK \$2,300
India.....	₹10,000
Japan.....	Yen 44,300
Korea.....	KRW 375,000
Malaysia.....	RM 780
New Zealand.....	NZ \$530
Singapore & Brunei.....	S \$425
Taiwan.....	NT \$9,000
Thailand.....	US \$300
Other countries.....	Contact us as above



PEFC certified This copy of The Economist is printed on paper sourced from sustainably managed forests, recycled and controlled sources certified by PEFC www.pefc.org

Contents



On the cover

If Xi Jinping reforms China's economy, he could both calm the trade war and make his country richer: leader, page 11. The struggle over economic policy, see our essay, page 41

• India v Pakistan—again An election raises the stakes as India weighs its response to the latest of many Pakistan-backed terrorist outrages, page 21. Pakistan faces a diplomatic squeeze from three sides, page 22

• Hatred in France A nasty brew—anti-Semitic, anti-black, anti-elite—is bubbling, page 47

• The sly appeal of private equity It is not just growth that attracts investors: Buttonwood, page 68

• How to stay sane on a trip to Mars Imagine being cooped up for three years with the same handful of irritating people, page 71. Opportunity, a rover on Mars that exceeded all expectations, was declared lost on February 12th: Obituary, page 82

The world this week

- 8 A round-up of political and business news

Leaders

- 11 China's economy Can pandas fly?
12 British politics Splitting image
12 Trump's emergency Imperial purple
13 Business and climate Hot, unbothered
14 Teaching in English Babel is better

Letters

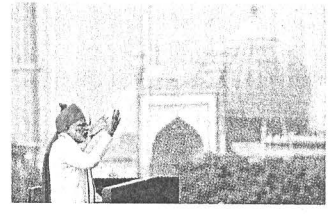
- 16 On Huawei, Gaelic, light, Iran, doctors, work

Briefing

- 18 Opioids The death curve

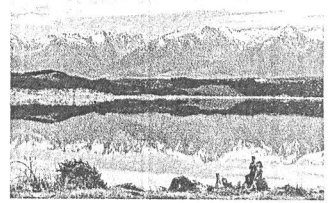
Asia

- 21 India weighs punishing Pakistan
22 Islamabad's isolation
22 Japan's boom in literature by the elderly
23 Banyan The Trump-Kim show
24 The church in the Philippines



China

- 25 China's "weaponisation" of tourism
26 A plan for Hong Kong
27 Chaguan Who'd be a Chinese journalist?



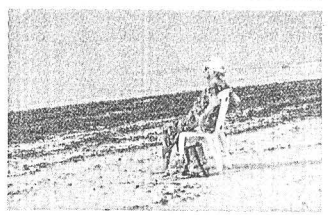
United States

- 28 Donald Trump's wall
29 Bernie runs again
30 Rahm Emanuel
31 Snooping on social media
32 The revival of Hawaiian
33 Lexington Diversity and its discontents



The Americas

- 34 Brazilian pensions
35 Tweeting in Cuba
35 Trudeau's travails
36 Bello Venezuela and Trump



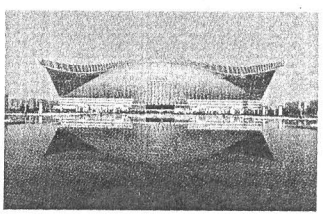
Middle East & Africa

- 37 Returning jihadists
38 The Israeli left
39 Africa's welfare states
40 Paid mourners in Congo
40 Social mobility



Essay: China's economy

- 41 A giant microcosm
43 Consumption and inequality
44 The market and the state
45 Global challenges



Banyan In the second date of the Trump-Kim love affair, due next week, the low expectations suit North Korea, page 23



Europe

- 47 Hatred in France
- 48 Business risk in Russia
- 49 Germany's fear of China
- 50 Vatican scandals
- 50 Denmark's pig wall
- 51 **Charlemagne** Saarland's secrets



Britain

- 52 Political realignments
- 53 Honda's departure
- 54 **Bagehot** John McDonnell



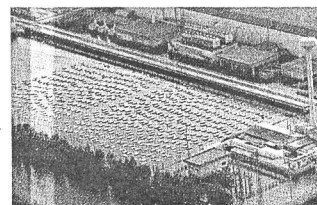
International

- 55 English or mother tongue in schools?



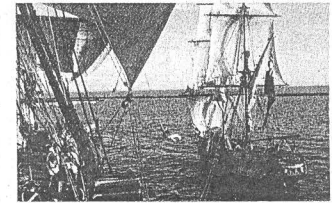
Business

- 58 Firms and climate change
- 60 The future of Chanel
- 60 Nvidia in trouble
- 61 **Bartleby** Aristocrat CEOs
- 62 Coffee trading
- 62 The risk from Huawei
- 63 Self-driving cars
- 64 **Schumpeter** Industrial cockroaches



Finance & economics

- 65 Corporate tax avoidance
- 66 UBS's hefty fine
- 67 Getting money into North Korea
- 67 Shorting Wirecard
- 68 **Buttonwood** Private equity's appeal
- 69 Soybeans and tariffs
- 70 **Free exchange** Raghuram Rajan on communities



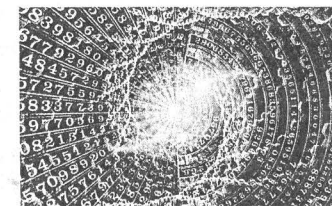
Science & technology

- 71 Surviving a trip to Mars
- 72 New crops fix nitrogen
- 73 The birth of atoms
- 74 How species spread



Books & arts

- 75 The quantification of everything
- 76 An overheating world
- 77 The Irish border
- 77 Gumbo: a love story
- 78 Lectures as art



Economic & financial indicators

- 80 Statistics on 42 economies

Graphic detail

- 81 Voters are unimpressed by Theresa May's Brexit deal

Obituary

- 82 Opportunity, humankind's longest-lived emissary to Mars



Volume 430 Number 9131

Published since September 1843 to take part in 'a severe contest between intelligence, which presses forward, and an unworthy, timid ignorance obstructing our progress.'

Editorial offices in London and also: Amsterdam, Beijing, Berlin, Brussels, Cairo, Chicago, Johannesburg, Madrid, Mexico City, Moscow, Mumbai, New Delhi, New York, Paris, San Francisco, São Paulo, Seoul, Shanghai, Singapore, Tokyo, Washington DC

Subscription service

For our full range of subscription offers, including digital only or print and digital combined, visit: Economist.com/offers

You can also subscribe by post, telephone or email:

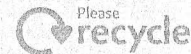
Post: The Economist Subscription Centre, Tanjong Pagar Post Office, P.O. Box 671, Singapore 910817, Republic of Singapore

Telephone: +65 6534 5166

Email: Asia@subscriptions.economist.com

One-year print-only subscription (51 issues):

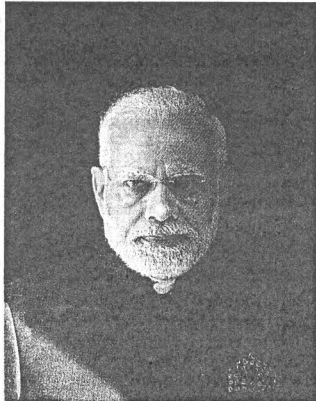
Australia.....	A \$465
China.....	CNY 2,300
Hong Kong & Macau.....	HK \$2,300
India.....	₹10,000
Japan.....	Yen 44,300
Korea.....	KRW 375,000
Malaysia.....	RM 780
New Zealand.....	NZ \$530
Singapore & Brunei.....	S \$425
Taiwan.....	NT \$9,000
Thailand.....	US \$300
Other countries.....	Contact us as above



PEFC certified This copy of The Economist is printed on paper sourced from sustainably managed forests, recycled and controlled sources certified by PEFC www.pefc.org

Contents

The Economist March 2nd 2019 3



On the cover

Two nuclear powers are shooting at each other. They are playing with fire: leader, page 9. Skirmishing between South Asia's nuclear powers is in danger of becoming a far more serious conflict, page 17. Narendra Modi and the struggle for India's soul, page 19

• Inside the new Pentagon After 18 years in the Middle East, the Pentagon gears up to fight Russia and China, page 28

• Kraft Heinz, a recipe gone wrong The problems of 3G Capital and Kraft Heinz are a timely reminder that cost-cutting, deals and debt go only so far: leader, page 10. The food industry's woes stretch much further, page 53

• The periodic table One of science's greatest creations is 150 years old this week. How it has evolved is a perfect illustration of the process of scientific progress, page 68

• Thirsty planet: a special report on water Climate change and population growth make the world's water woes more urgent, after page 40

The world this week

6 A round-up of political and business news

Leaders

9 India and Pakistan Modi's dangerous moment

10 Trump-Kim summit Walk on down

10 The parable of 3G Capital Bad recipe

12 Britain and the EU More haste, less speed

14 Drug repurposing Resurrection

Letters

16 On oil companies, Shropshire, Marcel Proust, Brexit

Briefing

17 India and Pakistan On perilous ground

19 Hindu nationalism Orange evolution

Special report: Water

Thirsty planet After page 40



Bagehot The European Research Group has broken British politics, page 50



Asia

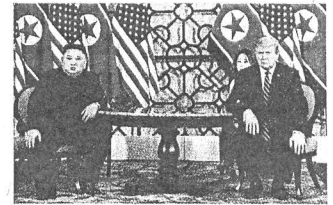
21 Another Trump-Kim summit

22 Divorce in Bangladesh

23 Foreign workers in Japan

23 Australia's dodgy cops

24 Banyan Japan's feud with South Korea

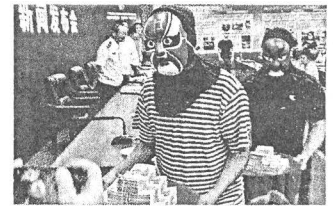


China

25 The war on gangs

26 Nurturing ethnic elites

27 Chaguan The West's struggle over China



United States

28 Inside the Pentagon

29 Michael Cohen

30 Church and state

30 Tech and privacy

31 Striking teachers

32 Ex-evangelicals

33 Lexington Democrats and climate change



The Americas

34 Venezuela repels humanitarian aid

35 Why the US won't invade

36 Bello Peru's neglected treasures



Middle East & Africa

37 Pressure on Netanyahu

38 The struggle for Iran

39 Sudan's emergency

39 Cricket in Rwanda

40 Nigeria's sloppy election



Handwritten notes in Hindi: 6/3/19, प्रलेखन प्रभाग, पुस्तकालय और प्रलेखन प्रभाग, 210 रोड 300 प्रो पद, नई दिल्ली-16

Europe

- 41 Spain's election
- 42 Baby bribes in Poland
- 43 Dirty and clean democracy
- 44 German arms sales
- 44 Berlin's brave bicyclists
- 45 Sputnik in Turkey



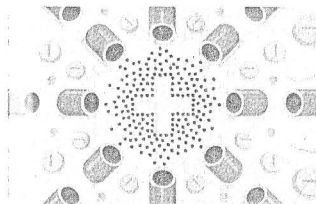
Britain

- 47 Losing control of Brexit
- 48 A rise in anti-Semitism
- 50 Bagehot The wrecking crew on the right



International

- 51 New uses for old drugs



Business

- 53 Kraft Heinz's accident with the ketchup
- 54 Buffettology
- 55 Cutting American drug prices
- 55 Gold miners get hostile
- 56 Bartleby Changing customer behaviour
- 57 Australian coal in trouble
- 58 Schumpeter Competitive video gaming



Finance & economics

- 59 German banks' woes
- 60 Stubbornly low inflation in the euro area
- 62 Encouraging tax compliance
- 62 The Federal Reserve reviews its framework
- 63 How to cross-check Elon Musk
- 64 Narendra Modi's economic record
- 65 Free exchange Global manufacturing woes



Science & technology

- 68 The periodic table at 150



Books & arts

- 72 A violent summer in Chicago
- 73 The Cleveland Orchestra
- 74 A submerged land
- 74 Hungarian fiction
- 75 Johnson Grammar guides



Economic & financial indicators

- 76 Statistics on 42 economies

Graphic detail

- 77 The Oscars' waning influence

Obituary

- 78 Li Rui, an advocate for freedom in China

The Economist

Volume 430 Number 9132  
 Published since September 1843  
 to take part in "a severe contest between intelligence, which presses forward, and an unworthy, timid ignorance obstructing our progress."

Editorial offices in London and also:  
 Amsterdam, Beijing, Berlin, Brussels, Cairo,  
 Chicago, Johannesburg, Madrid, Mexico City,  
 Moscow, Mumbai, New Delhi, New York, Paris,  
 San Francisco, São Paulo, Seoul, Shanghai,  
 Singapore, Tokyo, Washington DC

Subscription service

For our full range of subscription offers, including digital only or print and digital combined, visit: [Economist.com/offers](http://Economist.com/offers)

You can also subscribe by post, telephone or email:

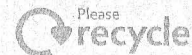
Post: The Economist Subscription Centre, Tanjong Pagar Post Office, P.O. Box 671, Singapore 910817, Republic of Singapore

Telephone: +65 6534 5166

Email: [Asia@subscriptions.economist.com](mailto:Asia@subscriptions.economist.com)

One-year print-only subscription (51 issues):

Australia.....	A \$575
China.....	CNY 2,778
Hong Kong & Macau.....	HK \$2,760
India.....	₹12,299
Japan.....	Yen 52,899
Korea.....	KRW 440,000
Malaysia.....	RM 940
New Zealand.....	NZ \$639
Singapore & Brunei.....	S \$509
Taiwan.....	NT \$10,799
Thailand.....	US \$350
Other countries.....	Contact us as above



PEFC certified  
 This copy of *The Economist* is printed on paper sourced from sustainably managed forests, recycled and controlled sources certified by PEFC  
[www.pefc.org](http://www.pefc.org)

# Educational Psychologist

Official Publication of the  
Division of Educational Psychology of the  
American Psychological Association

Copyright © 2018 by Division 15, American Psychological Association

Volume 53, Number 4, October–December 2018

## Special Issue: Conceptualizing Writing

<i>Introduction to Conceptualizing Writing</i> .....	217
STEVE GRAHAM	
<i>A Metacognitive Model of Writing: An Update From a Developmental Perspective.</i> .....	220
DOUGLAS J. HACKER	
<i>The Work of Writing: Raiding the Inarticulate</i> .....	238
DAVID GALBRAITH AND VEERLE M. BAAIJEN	
<i>A Revised Writer(s)-Within-Community Model of Writing</i> .....	258
STEVE GRAHAM	
<i>The Challenges of Writing in School: Conceptualizing Writing Development Within a Sociocognitive Framework.</i> .....	280
PAUL DEANE	
<i>What Does a Model Model? And for Whom?</i> .....	301
CHARLES BAZERMAN	

23/6/19

पलेखन प्रभाग  
पुस्तकालय और पलेखन प्रभाग  
एच १० अ० प्र० प०  
नई दिल्ली-१६

# Contents

Issue 120  
January 2019

## MAIN FEATURE

- 4 Listening: the forgotten skill 1**  
Lesley Lanir starts a new series on barriers to effective listening



## FEATURES

### LISTENING

- 8 Listen up!**  
Chiara Bruzzano adds variety to skills teaching

### SPEAKING

- 10 Time to think**  
Paul Morin believes preparation time is key

### SPEAKING

- 12 This is your pilot speaking ...**  
John Kay has students for whom slow speed is essential

### SPEAKING

- 13 How many have you got?**  
Chris Roland sees absent students as an opportunity for the others

### READING

- 16 Good news!**  
Mohamed Elhess exploits online news to cater for diversity

### READING

- 18 Making reading more fun**  
Graham Perry takes the solitude out of studying texts

### WRITING

- 22 Integrating writing**  
Mark Trevarton mixes writing with the other skills

### IN THE CLASSROOM

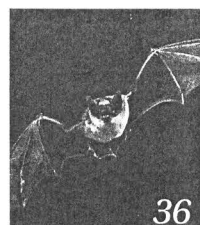
- 28 Students' stories 10**   
David Heathfield tells a tale of clever trickery

### VOCABULARY

- 39 Systematic word learning 1**   
Charles Jannuzi sets vocabulary learning off with sets of cards

### IN THE CLASSROOM

- 42 Let's revise!**  
Martin Bastkowski helps his students remember what they've learnt



## TEACHING YOUNG LEARNERS

- 26 Fan fiction**  
Benjamin Moorhouse exploits a growing genre to promote writing

## TEACHER DEVELOPMENT

- 44 Six minutes and 40 seconds**  
William Littlewood tackles pechà kucha presentations with trainees
- 48 No one told me that! 4**  
Beth Davies and Nicholas Northall offer more tips for those moving into teacher training

## TECHNOLOGY

- 52 Online testing**  
Anastasiya Shalamay assesses the technology for assessment
- 55 Unlocking the potential of SAMR**  
Flora Floris and Willy Renandya explain how a technology intergration model can transform speaking and writing tasks
- 58 Five things you always wanted to know about: using technology to promote reading skills**  
Nicky Hockly sees how IT can make a difference
- 59 Webwatcher**  
Russell Stannard creates flashcards with Quizlet

## REGULAR FEATURES

- 20 ENGLISH TEACHING CONFESSIONAL**  
Mario Rinvoluceri explains why he started writing to his students
- 32 IT WORKS IN PRACTICE**
- 34 REVIEWS**
- 36 SCRAPBOOK**
- 60 NOT ONLY, BUT ALSO ...**  
Chia Suan Chong examines how we can encourage a growth mindset

Includes materials designed to photocopy, some of which can now be downloaded from the ETp website (see page 3)

# Contents

ELT Journal Volume 72 Number 4 October 2018

## Articles

Remote tutoring of pre-service EFL teachers using iPads <i>Christopher Allen and Stella Hadjistassou</i>	353
Translation revisited for low-proficiency EFL writers <i>Mun Woo Lee</i>	365
Own-language use in teaching English to preschool children <i>Paweł Scheffler and Anna Domirińska</i>	374
Developing students' awareness of Global Englishes <i>Fan (Gabriel) Fang and Wei Ren</i>	384
Reading while listening to learn: young EFL learners' perceptions <i>Elsa Tragant and Anna Vallbona</i>	395
Incorporating task-based learning in an extensive reading programme <i>I-Chen Chen</i>	405
Teachers' professional identity development through action research <i>Kenan Dikilitaş and Demet Yaylı</i>	415
Patterns of pair interaction in communicative tasks: the transition process and effect on L2 teaching and learning <i>Wenxue Chen</i>	425
Student transcription for reflective language learning <i>Neil Cowie</i>	435

## Key concepts in ELT

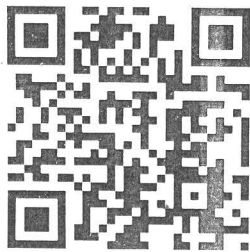
Translanguaging <i>Jean Conteh</i>	445
---------------------------------------	-----

## Reviews

Practical English Usage, 4th edn, fully revised by Michael Swan <i>Grzegorz Spiewak</i>	448
Language, Education and Neoliberalism: Critical Studies in Sociolinguistics by M.-C. Flubacher and A. Del Percio (eds.) <i>David Block</i>	452
The Routledge Handbook of English as a Lingua Franca by J. Jenkins, W. Baker, and M. Dewey (eds.) <i>Tomokazu Ishikawa</i>	455

Digital Language Learning and Teaching: Research, Theory, and Practice by M. Carrier, R. M. Damerow and K. M. Bailey (eds.) <i>Sophia Mavridi</i>	459
Why English? Confronting the Hydra by P. Bunce, R. Phillipson, V. Rapatahana and R. Tupas (eds.) <i>John Knagg</i>	462
Complexity Theory and Language Development: In Celebration of Diane Larsen-Freeman by L. Ortega and Z.H. Han (eds.) <i>Pengyun Chang and Lawrence Jun Zhang</i>	466
IATEFL	469
Annual Index: Volume 72 (2018)	471

Please visit ELT Journal's website at <http://academic.oup.com/eltj>



This is a QR code. Scan to view the journal on your mobile device.



BOOK NOTES

- KRISTA GOLDSTINE-COLE 593 *Uneasy Peace: The Great Crime Decline, the  
Renewal of City Life and the Next War on  
Violence*  
by Patrick Sharkey
- RAQUEL L. JIMENEZ 597 *When Grit Isn't Enough: A High School  
Principal Examines How Poverty and Inequality  
Thwart the College-for-All Promise*  
by Linda F. Nathan
- SIBYLLA LEON GUERRERO 599 *The Experience of Neoliberal Education*  
Edited by Bonnie Urciuoli
- CELIA REDDICK 602 *The Newcomers: Finding Refuge, Friendship, and  
Hope in an American Classroom*  
by Helen Thorpe
- 606 NOTES ON CONTRIBUTORS
- 609 GUIDELINES FOR AUTHORS
- 613 INDEX TO VOLUME 88

# Intellectual and Developmental Disabilities

VOLUME 57  
NUMBER 1  
FEBRUARY 2019

Handwritten notes: 18/1/19, अलेख प्रभात, दिल्ली-16

## POLICY

- 1 State Utilization of Direct Support Professionals in Medicaid HCBS Waivers  
CARLI FRIEDMAN

## PRACTICE

- 14 An Algorithmic Approach to Nutritional Difficulties in People With Developmental Disabilities  
SUMA CHENNUHOTLA, REBECCA HERTO, JOHN E. WILLIAMS, DEBRA HANNA, AND THOMAS L. ABELL
- 26 Understanding Decision Making Among Individuals With Intellectual and Developmental Disabilities (IDD) and Their Siblings  
MEGHAN M. BURKE, CHUNG EUN LEE, SARAH A. HALL, AND ZACH ROSSETTI
- 42 Service-Learning and Students With Severe Disabilities: Examining Participation and Curricular Goals  
MICHELLE L. BONATI AND STACY K. DYMOND

## RESEARCH

- 56 Supporting Families Through the Charting the LifeCourse Framework  
GEORGE S. GOTTO, MICHELLE C. REYNOLDS, SUSAN B. PALMER, AND DANIELLE F. CHIANG
- 66 In Their Own Words: Perceptions and Experiences of Bullying Among Individuals With Intellectual and Developmental Disabilities  
MEGAN M. GRIFFIN, MARISA H. FISHER, LAUREL A. LANE, AND LINDSAY MORIN
- 75 Résumés en Français
- 77 Resúmenes al Español

# International Journal of Educational Research

41

Vol 85  
Sep. 2017

Website: <http://www.elsevier.com/locate/ijedures>

## REGULAR ARTICLES

ENHANCING SELF-REGULATED LEARNING THROUGH USING WRITTEN FEEDBACK IN HIGHER EDUCATION—G. Ion, E. Cano-García and M. Fernández-Ferrer

CAREER GUIDANCE, SCHOOL EXPERIENCES AND THE UNIVERSITY PARTICIPATION OF YOUNG PEOPLE FROM LOW SOCIO-ECONOMIC BACKGROUNDS—W. Tomaszewski, F. Perales and N. Xiang

THINKING GLOBALLY OR “GLOCALLY”? BILINGUAL IDENTITY OF VIETNAMESE INTERNATIONAL SCHOOL STUDENTS—T.T.T. Nguyen and H.T.M. Nguyen

A SNAPSHOT OF EDUCATION BEHIND THE FENCE: SUPPORTING ENGAGEMENT IN EDUCATION OF INCARCERATED YOUTH IN AUSTRALIA—I. Strnadová, S.C. O’Neill and T.M. Cumming

THE EFFECT OF HAND MOVEMENTS ON BRAILLE READING ACCURACY—V. Papadimitriou and V. Argyropoulos

CHANGES IN PRIMARY SCHOOL STUDENTS’ USE OF SELF AND SOCIAL FORMS OF REGULATION OF LEARNING ACROSS COLLABORATIVE INQUIRY ACTIVITIES—S. Ucan

SCHOOL AND INSTITUTIONAL EFFECTS ON SECONDARY EDUCATION TRANSITIONS IN MEXICO—M.B. Torres

THE RETURNS TO MATURE-AGE EDUCATION IN AUSTRALIA—F. Perales and J. Chesters

HOW MANY ARE TALKING? THE ROLE OF COLLECTIVITY IN DIALOGIC TEACHING—M. Sedlacek and K. Sedova

DOES PARTICIPATION IN UNIFORMED GROUP ACTIVITIES IN SCHOOL IMPROVE YOUNG PEOPLE’S NON-COGNITIVE OUTCOMES?—B.H. See, S. Gorard and N. Siddiqui

EMOTIONAL INTELLIGENCE AND TEACHER BURNOUT: A SYSTEMATIC REVIEW—S. Mérida-López and N. Extremera

PARENTS’ INTEREST IN THEIR CHILD’S EDUCATION AND CHILDREN’S OUTCOMES IN ADOLESCENCE AND ADULTHOOD: DOES GENDER MATTER?—A.K. Campbell, J. Povey, K.J. Hancock, F. Mitrou and M. Haynes

(Contents continued on ...)



ELSEVIER



0883-0355(2017)85:C;1-W

Indexed/Abstracted

Aus. Educ.

Also covered in the abstract  
citation database Sci

Full text available on ScienceDirect

LOC 77-

85 1-184

THE IDEAL UNIVERSITY CLASSROOM: STORIES BY STUDENTS WITH DISABILITIES—B.M. Camacho, Lopez-Gavira and A.M. Díez	148
NAVIGATING THE BOUNDARIES BETWEEN HOME, WORK AND SCHOOL. TEACHING VALUES AND LITERACIES IN VET—H. Fjørtoft	157
SCIENCE TEACHING AND STUDENTS' ATTITUDES AND ASPIRATIONS: THE IMPORTANCE OF CONVEYING THE APPLICATIONS AND RELEVANCE OF SCIENCE—R. Sheldrake, T. Mujtaba and J. Reiss	167

# International Journal of <sup>43</sup> Educational Research

Vol. 86  
Dec. 2017

Website: <http://www.elsevier.com/locate/ijedures>

## REGULAR ARTICLES

TRANSGENDER STUDENTS IN POST-COMPULSORY EDUCATION: A SYSTEMATIC REVIEW—  
T. Hafford-Letchfield, A. Pezzella, L. Cole and R. Manning

EFFECTS OF CLASSROOM GOAL STRUCTURES ON STUDENT EMOTIONS AT SCHOOL—N. Baudoin  
and B. Galand

RESEARCH PROTOCOL: TEACHER INTERVENTIONS AIMED AT ENGAGING STUDENTS IN  
DIALOGIC MATHEMATICS CLASSROOM DISCOURSE—Y. Ni, G. Ho, J. Cai, A. Cheung, G. Chen and  
O.-L. Ng

IMPACT OF PEER COACHING STRATEGY ON PRE-SERVICE TEACHERS' PROFESSIONAL  
DEVELOPMENT GROWTH IN KUWAIT—A. Alsaleh, M. Alabdulhadi and N. Alrwaished

EFFECTS OF THE COGNITIVE-BEHAVIORAL YOU CAN DO IT! EDUCATION PROGRAM ON THE  
RESILIENCE OF JAPANESE ELEMENTARY SCHOOL STUDENTS: A PRELIMINARY INVESTIGATION—  
T. Yamamoto, Y. Matsumoto and M.E. Bernard

RESEARCH PROTOCOL: A CLUSTER-RANDOMISED STUDY EVALUATING THE EFFECTIVENESS  
OF A SKILL-TRAINING PROGRAMME FOR SOCIAL WORK PROFESSIONALS FOR IMPROVING  
THE FOLLOW-UP OF LOW-INCOME FAMILIES WITHIN NORWEGIAN WELFARE SERVICES—  
I. Malmberg-Heimonen, A.G. Tøge, K. Gyüre, M. Rugkåsa, K. Fossestøl, B. Bergheim and T. Liodden

A META-ANALYSIS OF THE EFFECT OF PEER INSTRUCTION ON LEARNING GAIN: IDENTIFICATION  
OF INFORMATIONAL AND CULTURAL MODERATORS—N. Balta, N. Michinov, S. Balyirmez and  
M.F. Ayaz

PROTOCOL: A FEASIBILITY STUDY AND A PILOT CLUSTER RANDOMISED CONTROLLED TRIAL  
OF THE PAX 'GOOD BEHAVIOUR GAME' IN DISADVANTAGED SCHOOLS—J. O'Keeffe, A. Thurston,  
F. Kee, L. O'Hare and K. Lloyd

PROTOCOL: 'ON TRACK', A GROUP-RANDOMIZED CONTROLLED TRIAL OF AN EARLY READING  
INTERVENTION—K. Lundetræ, O.J. Solheim, K. Schwippert and P.H. Uppstad

(Contents continued on ...)



ELSEVIER



0883-0355(2017)86:C;1-V

Indexed/Abstracted  
Aus. Educ.  
Also covered in the abstract  
citation database  
Full text available on ScienceDirect  
LOC 7  
86 1-14

ATTAINMENT GROUPING AS SELF-FULFILLING PROPHECY? A MIXED METHODS EXPLORATION OF SELF CONFIDENCE AND SET LEVEL AMONG YEAR 7 STUDENTS—B. Francis, P. Connolly, L. Archer, J. Hodgen, A. Mazonod, D. Pepper, S. Sloan, B. Taylor, A. Tereshchenko and M.-C. Travers	96
THE INTERPLAY BETWEEN CLASS HETEROGENEITY AND TEACHING QUALITY IN PRIMARY SCHOOL—J. Decristan, B. Fauth, M. Kunter, G. Büttner and E. Klieme	109
STUDY PROTOCOL: “TWO TEACHERS”: A RANDOMIZED CONTROLLED TRIAL INVESTIGATING INDIVIDUAL AND COMPLEMENTARY EFFECTS OF TEACHER-STUDENT RATIO IN LITERACY INSTRUCTION AND PROFESSIONAL DEVELOPMENT FOR TEACHERS—O.J. Solheim, M. Rege and E. McTigue	122
CHILDREN AS RESEARCH PARTICIPANTS IN EDUCATIONAL RESEARCH USING VIDEO-STIMULATED ACCOUNTS—M. Theobald	131

(45)

# International Journal of Educational Research

Vol. 91

2018

Website: <http://www.elsevier.com/locate/ijedures>

## REGULAR ARTICLES

- |  |    |
|--|----|
| DEVELOPING AND VALIDATING THE INTERNATIONAL DEVELOPMENT AND EARLY LEARNING ASSESSMENT (IDELA)<br>L. Pisani, I. Borisova and A.J. Dowd  | 1  |
| CHARACTERISTICS ASSOCIATED WITH PAPER-BASED AND ONLINE READING IN IRELAND: FINDINGS FROM PIRLS AND EPIRLS 2016<br>L. Gilleece and E. Eivers  | 16 |
| CROSS-CULTURAL COLLABORATIVE INQUIRY: A COLLECTIVE CASE STUDY WITH STUDENTS FROM CHINA AND THE US<br>H.A. Spires, C. Medlock Paul, M. Himes and C. Yuan  | 28 |
| RESEARCH PROTOCOL: A CLUSTER-RANDOMISED STUDY EVALUATING THE EFFECTS OF A MODEL FOR IMPROVING INTER-PROFESSIONAL COLLABORATION IN NORWEGIAN PRIMARY SCHOOLS<br>T. Saltkjel, A.G. Tøge, I. Malmberg-Heimonen, E. Borg, S.T. Lyng, C. Wittrock, Ø. Pålshaugen, K. Fossetøl, H. Christensen and T. Lund | 41 |
| NURTURING KINDNESS NATURALLY: A HUMANE EDUCATION PROGRAM'S EFFECT ON THE PROSOCIAL BEHAVIOR OF FIRST AND SECOND GRADERS ACROSS CHINA<br>W.E. Samuels   | 49 |



0883-0355(2018)91:C;1-U

Indexed/Abstracted in  
*Aus. Educ. Indx*;  
Also covered in the abstract and  
citation database Scopus®.  
Full text available on ScienceDirect®  
LOC 77-81507  
91 1-64 (2018)

Printed In The Netherlands



**International Research in Geographical and Environmental Education**  
Volume 27 Number 4 November 2018

---

**CONTENTS**

**Editorial**

- 281 The future of education for sustainable development - where next after a decade of discourse?  
*Chew-Hung Chang and Gillian Kidman*
- 283 Nationwide perceptions of US green school practices: implications for reform and research  
*Bryan Wee, Hillary Mason, Jason Abdilla, and Randi Lupardus*
- 295 What is the level of scientific literacy among geography students studying bachelor's studies in natural sciences?  
*Elena Čipková, Štefan Karolčík, Klára Sládková, and Katarína Ušáková*
- 311 School geography: what interests students, what interests teacher?  
*Gillian Kidman*
- 326 Effects of nature-based environmental education on the attitudes of 7th grade students towards the environment and living organisms and affective tendency  
*Murat Genc, Tulin Genc, and Pinar Goc Rasgele*
- 342 Education for Sustainable Development in Vietnam: exploring the geography teachers' perspectives  
*Thao Phuong Nguyen*
- 358 Junior high school Chinese students' images of the geographer: a study of their drawings  
*Daihu Yang*

ation  
from

tent)  
make  
. Any  
ed by  
ld be  
ot be  
wso-  
tions

terial  
ction  
ction  
rance  
y, 90  
nd of

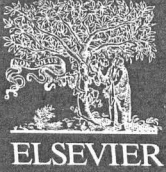
# International Social Science Journal

September–December 2017 **225/226**

Vol. 67 No. 3/4 2017

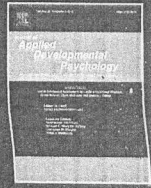
	Abstracts	81
Nolan Blodgett, Rory Coughlan and Neha Khullar	Overcoming the barriers in transgender healthcare in rural Ontario: discourses of personal agency, resilience, and empowerment	83
Zachary D. Palmer and Mangala Subramaniam	Abstract egalitarianism and men as victims: strategic choice of frames by men’s rights organisations	97
Robert Flahive	Producing World Heritage in the White City Tel Aviv	109
Taewoo Nam	What enhances the right to information? A cross-national examination of legal, technological, and administrative influences	121
Ronaldo Cabauatan and Virgilio M. Tatlonghari	Analysing energy consumption in the Philippines using vector error correction	137
Modupe Alake Ayoade	Spatio-temporal patterns and determinants of infant mortality in Nigeria	151
	Call for Papers - <i>International Social Science Journal</i>	169
	Call for Special Issue Proposals	171
	Past issues	173

418



# Volume 60, January/February 2019

## CONTENTS



*Journal of Applied Developmental Psychology* is abstracted in *Child Development Abstracts*, *Psych Scan*, *ERA*, *Psychological Abstract*, *PsycINFO* and *Scopus*.

### RESEARCH PAPERS

Home-literacy environment of low-income rural families: Association with child- and caregiver-level characteristics <i>Maureen J. Myrttil, Laura M. Justice and Hui Jiang</i>	1	Stigma, treatment, and health among stimulant users: Life stage as a moderator <i>Erin L. Woodhead, Christopher Timko, Xiaorong Han and Michael A. Cucciare</i>	96
An experimental study of the effects of autonomy support on preschoolers' self-regulation <i>Alyssa S. Meuwissen and Stephanie M. Carlson</i>	11	Maternal and paternal stimulation: Mediators of parenting intervention effects on preschoolers' development <i>Joshua Jeong, Jelena Obradović, Muneera Rasheed, Dana Charles McCoy, Gilmer Fink and Aisha K. Yousafzai</i>	105
Children's adaptive decision making and the costs of information search <i>Stefanie Lindow and Tilmann Betsch</i>	24	Teachers' ratings of social skills and problem behaviors as concurrent predictors of students' bullying behavior <i>Stephen N. Elliott, Yoon-Sook Hwang and Jin Wang</i>	110
The role of teacher emotional support in children's cross-ethnic friendship preferences <i>Marina Serdiouk, Travis M. Wilson, Scott D. Gest and Daniel Berry</i>	35	From external regulation to school achievement: The mediation of self-efficacy at school <i>Elena Cattellino, Mara Morelli, Roberto Baiocco and Antonio Chirumbolo</i>	127
Commonality between executive functioning and effortful control related to adjustment <i>Jungmeen Kim-Spoon, Kirby Deater-Deckard, Susan D. Calkins, Brooks King-Casas and Martha Ann Bell</i>	47	Mothers' depressive symptoms and responses to preschoolers' emotions: moderated by child expression <i>Qiong Wu, Emma Hooper, Xin Feng, Micah Gerhardt and Seulki Ku</i>	134
Self-regulation mitigates the association between household chaos and children's behavior problems <i>Laura M. Crespo, Christopher J. Trentacosta, Ini Udo-Inyang, Laura Northerner, Kiren Chaudhry and Alexis Williams</i>	56	Developmental precursors of engagement and motivation in fifth grade: Linkages with parent- and teacher-child relationships <i>Melissa Castle Heatly and Elizabeth Votruba-Drzal</i>	144
Profiles of classroom activity settings associated with Head Start children's receptive vocabulary <i>Christine N. Lippard, Ji Young Choi and Melissa C. Walter</i>	65	Friendship network influence on the development of internalizing symptoms during adolescence <i>Glen J. Veed, Meredith McGinley and Lisa J. Crockett</i>	157
Predicting child problem behavior and maternal/paternal parent-child aggression: Identifying early prevention targets <i>Christina M. Rodriguez and Shannon M.O. Wittig</i>	76	Observing children's engagement: Examining factorial validity of the inCLASS across demographic groups <i>Natalie L. Bohlmann, Jason T. Downer, Amanda P. Williford, Michelle F. Maier, Leslie M. Booren and Carollee Howes</i>	166
Theory of mind and peer cooperation in two play contexts <i>Evren Etel and Virginia Slaughter</i>	87		



0193-3973(201901/02)60:0;1-W

Available online at [www.sciencedirect.com](http://www.sciencedirect.com)

ScienceDirect

# Journal of & Counseling Development

Volume 97 ■ Number 1 ■ January 2019

## ■ Assessment & Diagnosis

Differential Estimation of Treatment Effect Between  
Clinician-Administered and Self-Reported PTSD Assessments ■ 3  
A. Stephen Lenz & Ye Luo

Systematic Evaluation of Psychometric Characteristics of the  
Michigan Alcoholism Screening Test 13-Item Short (SMAST)  
and 10-Item Brief (BMAST) Versions ■ 15  
Amelia Minnich, Bradley T. Erford, Gerta Bardhoshi, Zümra Atalay,  
Catharine Y. Chang, & Lauren A. Muller

## ■ Research

Marketing of Professional Counselors:  
A Q-Sort Study of Best Practices ■ 25  
Donna S. Sheperis, Komal Korani,  
Marsha Milan-Nichols, & Carl J. Sheperis

A Systematic Review of Online Response Rates  
in Four Counseling Journals ■ 33  
Timothy A. Poynton, Emily R. DeFouw, & Laura J. Morizio

School Counselors, Multiple Student Deaths, and Grief:  
A Narrative Inquiry ■ 43  
Michael D. Hannon, Raman K. Mohabir,  
Richard E. Cleveland, & Brandon Hunt

Reducing Alcohol-Related Consequences  
Among High School Seniors:  
Efficacy of a Brief, Web-Based Intervention ■ 53  
Diana M. Doumas & Susan Esp

Defining Wellness in Older Adulthood:  
Toward a Comprehensive Framework ■ 62  
Matthew C. Fullen

*(Continued on next page)*

Multiracial Identity, Color-Blind Racial Ideology,  
and Discrimination: Professional Counseling Implications ■ 75  
C. Peeper McDonald, Catherine Y. Chang,  
Franco Dispenza, & Caroline O'Hara

Challenges and Coping Mechanisms of Whites Committed to Antiracism ■ 86  
Krista M. Malott, Scott Schaeffle, Tina R. Paone,  
Jennifer Cates, & Breyan Haizlip

Trends in Ethical Complaints Leading to  
Professional Counseling Licensing Boards Disciplinary Actions ■ 98  
Tyler Wilkinson, Dannielle Smith, & Ramona Wimberly

■ Theory & Practice

A Constructive Approach to Help Counselors Work  
With Clients Who Express Discriminatory Views ■ 105  
Douglas Guiffrida, Mathew Tansey, & Daniel Miller

■ Other

Guidelines for Authors ■ 113

# Counseling Psychology®

January 2019

Volume 66  
Number 1

www.apa.org/pubs/journals/cou

© 2019  
American  
Psychological  
Association

## Articles

- 1 Work and Well-Being in TGNC Adults: The Moderating Effect of Workplace Protections  
*Elliot A. Tebbe, Blake A. Allan, and Haley L. Bell*  
Marginalization significantly shapes career and workplace experiences and emotional and vocational outcomes for TGNC people. Legal protection from discrimination significantly buffers the deleterious impact of marginalization, pointing to the need for research and advocacy to address underlying structures that allow marginalization to occur.
  
- 14 The Development and Psychometric Evaluation of the Trans Discrimination Scale: TDS-21  
*Laurel B. Watson, Luke R. Allen, Mirella J. Flores, Christine Serpe, and Michelle Farrell*  
This study describes the development of a measure of trans discrimination, named the Transgender Discrimination Scale-21 (TDS-21). Our findings suggest that the TDS-21 is a reliable and valid measure that may be used by researchers, practitioners, advocates, and policymakers to better understand the influence of trans discrimination on trans peoples' lives.
  
- 30 Testing Intersectionality of Race/Ethnicity × Gender in a Social-Cognitive Career Theory Model With Science Identity  
*Angela Byars-Winston and Jenna Griebel Rogers*  
Results of this study demonstrated some ways that research-related learning experiences are related to the research career intentions of undergraduate science, technology, engineering, and math (STEM) students and how these experiences may be different for African American and Latino/a men and women. It may be useful to consider the different research learning experiences of historically underrepresented groups in academic and career interventions aimed at supporting their research career intentions toward the larger goal of diversifying the STEM workforce.
  
- 45 Construction and Validation of the Multicultural Orientation Inventory—Group Version  
*D. Martin Kivlighan III, Marie C. Adams, Joanna M. Drinane, Karen W. Tao, and Jesse Owen*  
This study provides evidence for the psychometric properties of the Multicultural Orientation Inventory—Group Version, a measure assessing the cultural humility, cultural comfort, and cultural missed opportunities in therapy groups. Additionally, this study highlights the role of cultural processes in effective psychotherapy groups.
  
- 56 Clients' Emotional Instability and Therapists' Inferential Flexibility Predict Therapists' Session-by-Session Empathic Accuracy  
*Gal Lazarus, Dana Atzil-Slonim, Eran Bar-Kalifa, Ilanit Hasson-Ohayon, and Eshkol Rafaeli*  
We examined psychotherapists' varying levels of accuracy in perceiving their clients' emotions during psychotherapy and explored predictors of these levels. Our findings indicate that clients whose emotions during psychotherapy sessions were more unstable were harder to read by their therapists and that therapists whose inferences of their clients' emotions were more flexible were more accurate in tracking client emotions.

(Contents continue)

- 70 Secrets in Psychotherapy: For Better or Worse?  
*Ellen C. Marks, Clara E. Hill, and Dennis M. Kivlighan Jr.*  
The results from this study suggest that in open-ended psychotherapy, disclosure of secrets occurs more often and is more closely related to the client's view of the therapeutic relationship and session quality than is concealment of secrets. The results also indicate that certain types of secrets, specifically those that are significant and preoccupying, matter in determining the patterns and impact of client concealment and disclosure.
- 83 Therapist-Client Agreement About Their Working Alliance: Associations With Attachment Styles  
*Seini O'Connor, Dennis M. Kivlighan Jr., Clara E. Hill, and Charles J. Gelso*  
This study suggests that when therapists and clients have similar tendencies in the ways that they relate to others, therapists are closer in agreement with their clients about the strength of their working alliance session-to-session. This finding can provide motivation for therapists to engage in self-discovery around their own relational styles, as well as training in recognizing clients' relational styles, to build their skills in accurately identifying when therapeutic relationships need improvement and thus enhance the effectiveness of psychotherapy for clients with differing relational patterns.
- 94 Adherence, Flexibility, and Outcome in Psychodynamic Treatment of Depression  
*Michael Katz, Mark J. Hilsenroth, Jerold R. Gold, Michael Moore, Seth R. Pitman, Saryn R. Levy, and Jesse Owen*  
This study suggests that for psychodynamic therapists working with depressed patients, flexibility and responsiveness early in treatment by incorporating some limited amount of cognitive-behavioral techniques alongside a general adherence to a dynamic model of treatment leads to better outcome. These findings provide further support to the importance
- 104 Different Strokes for Different Folks: Examining Additive and Complimentary Effects of the Advisory Working Alliance and Research Team Cohesion on Trainees' Research Outcomes  
*D. Martin Kivlighan III, Rayna C. Narvaez, and Walter Carter*  
This study tested the contribution of the advisory working alliance and research team cohesion to trainees' research self-efficacy and research activity. Results suggest that two complementary components of research training environments are the advisory working alliance and trainee cohesion. Trainers should seek to develop strong advisory alliances and facilitate trainee cohesion to increase trainees' research self-efficacy and research activity. of therapist flexibility and responsiveness.

**Brief Reports**

- 114 Toward a Nuanced Understanding of Nondisclosure in Psychotherapy Supervision  
*Andrew S. Gibson, Michael V. Ellis, and Myrna L. Friedlander*  
The effectiveness of psychotherapy supervision depends in part on a trainee's willingness to discuss all aspects of the clinical experience with the supervisor. In a sample of 257 trainees, we found that an interpersonal approach to supervision was significantly associated with less withholding of clinically related and supervision-related material.
- 122 Examining Therapist Effects in Relation to Clients' Race-Ethnicity and Gender: An Intersectionality Approach  
*D. Martin Kivlighan III, Isaac W. Hooley, Maria G. Bruno, Lanaya L. Ethington, Paula M. Keeton, and Barry A. Schreier*  
This study provides evidence of therapists' differential effectiveness with Women of Color, Men of Color, White women, and White men. Therapist effectiveness differed based on clients' intersecting identities of race-ethnicity and gender.

**Other**

- iii Call for Papers on New Approaches to Exploring Processes of Change in Counseling Psychology
- 29 Correction to Watson et al. (2018)
- 121 E-Mail Notification of Your Latest Issue Online!
- 130 Instructions to Authors
- 44 Subscription Order Information

---

**CONTENTS**

**Volume 49 Number 4 2018**

**RESEARCH IN ECONOMIC EDUCATION**

- Gender difference in willingness to guess after a failure  
*Giam Pietro Cipriani* 299
- Adjusting for guessing and applying a statistical test to the disaggregation  
of value-added learning scores  
*Ben O. Smith and Jamie Wagner* 307
- Measuring faculty teaching effectiveness using conditional fixed effects  
*Maia Linask and James Monks* 324

**ECONOMIC INSTRUCTION**

- The great American health care debate: A classroom game to explore risk and  
insurance  
*Kelly Grogan* 340

**FEATURES AND INFORMATION**

- Assessment of economic competencies using a matrix puzzle and a document  
analysis  
*William B. Walstad* 350

**ONLINE**

- Economics gone country  
*Mark A. Melichar* 363
- Economics media library  
*Jadrian J. Wooten* 364
- Exponential smoothing spreadsheets  
*R. Scott Harris, Joshua Hill, and Talia Harris* 366

**LIST OF REVIEWERS**

- REVIEWERS FOR VOLUME 49 367

Journal of

# Educational Psychology<sup>®</sup>

January 2019

Volume 111  
Number 1

www.apa.org/pubs/journals/edu

## Reading

© 2019  
American  
Psychological  
Association

- 1 The Reading Comprehension and Vocabulary Knowledge of Children With Poor Reading Comprehension Despite Adequate Decoding: Evidence From a Regression-Based Matching Approach  
*Mercedes Spencer, Richard K. Wagner, and Yaacov Petscher*
- 15 Examining Developmental Relations Between Core Academic Language Skills and Reading Comprehension for English Learners and Their Peers  
*Emily Phillips Galloway and Paola Uccelli*

## Learning and Teaching

- 32 Learning Vocabulary From Educational Media: The Role of Pedagogical Supports for Low-Income Preschoolers  
*Susan B. Neuman, Kevin M. Wong, Rachel Flynn, and Tanya Kaefer*
- 45 Enhancing Example-Based Learning: Teaching on Video Increases Arousal and Improves Problem-Solving Performance  
*Vincent Hoogerheide, Alexander Renkl, Logan Fiorella, Fred Paas, and Tamara van Gog*
- 57 The More Human, the Higher the Performance? Examining the Effects of Anthropomorphism on Learning With Media  
*Sascha Schneider, Alexandra Häßler, Tanja Habermeyer, Maik Beege, and Günter Daniel Rey*
- 73 The Optimal Learning Strategy Depends on Learning Goals and Processes: Retrieval Practice Versus Worked Examples  
*Darren J. Yeo and Lisa K. Fazio*
- 91 Analytical Assessment of Course Sequencing: The Case of Methodological Courses in Psychology  
*Laura Betancur, Benjamin Margolin Rottman, Elizabeth Votruba-Drzal, and Christian Schunn*
- 104 Adult and Student Interactions in Nonclassroom Settings  
*Anne H. Cash, Katrina J. Debnam, Tracy E. Waasdorp, Mary Wahl, and Catherine P. Bradshaw*
- 118 The Negative Year in School Effect: Extending Scope and Strengthening Causal Claims  
*Philip D. Parker, Herbert W. Marsh, Felix Thoemmes, and Nicholas Biddle*
- 131 University Instructors' Achievement Goals for Teaching  
*Martin Daumiller, Oliver Dickhäuser, and Markus Dresel*


(Contents continue)

**Social and Emotional Aspects of Learning**

- 149 Reconsidering Jigsaw Social Psychology: Longitudinal Effects on Social Interdependence, Sociocognitive Conflict Regulation, Motivation, and Achievement  
*Cary J. Roseth, You-kyung Lee, and William A. Saltarelli*
- 170 Social and Emotional Behavioral Profiles in Kindergarten: A Population-Based Latent Profile Analysis of Links to Socio-Educational Characteristics and Later Achievement  
*Rebecca J. Collie, Andrew J. Martin, Natasha Nassar, and Christine L. Roberts*

**Other**

- 148 E-Mail Notification of Your Latest Issue Online!
- 188 Instructions to Authors
- 117 Members of Underrepresented Groups: Reviewers for Journal Manuscripts Wanted
- ii Subscription Order Information

 AMERICAN PSYCHOLOGICAL ASSOCIATION  

# APA JOURNALS®

## ORDER INFORMATION

Start my 2019 subscription to the  
***Journal of Educational Psychology***®  
 ISSN: 0022-0663

**PRICING**

APA Member/Affiliate	\$131
Individual Nonmember	\$271
Institution	\$1,051

Call **800-374-2721** or **202-336-5600**  
 Fax **202-336-5568** | TDD/TTY **202-336-6123**

**Subscription orders must be prepaid.** Subscriptions are on a calendar year basis. Please allow 4-6 weeks for delivery of the first issue.

Learn more and order online at:  
[www.apa.org/pubs/journals/edu](http://www.apa.org/pubs/journals/edu)

Visit [on.apa.org/circ2019](http://on.apa.org/circ2019)  
 to browse APA's full journal collection.

All APA journal subscriptions include online first journal articles and access to archives. Individuals can receive online access to all of APA's 88 scholarly journals through a subscription to APA PsycNET®, or through an institutional subscription to the PsycARTICLES® database.

EDUA19

(56)

# लोकसंस्कृतम्

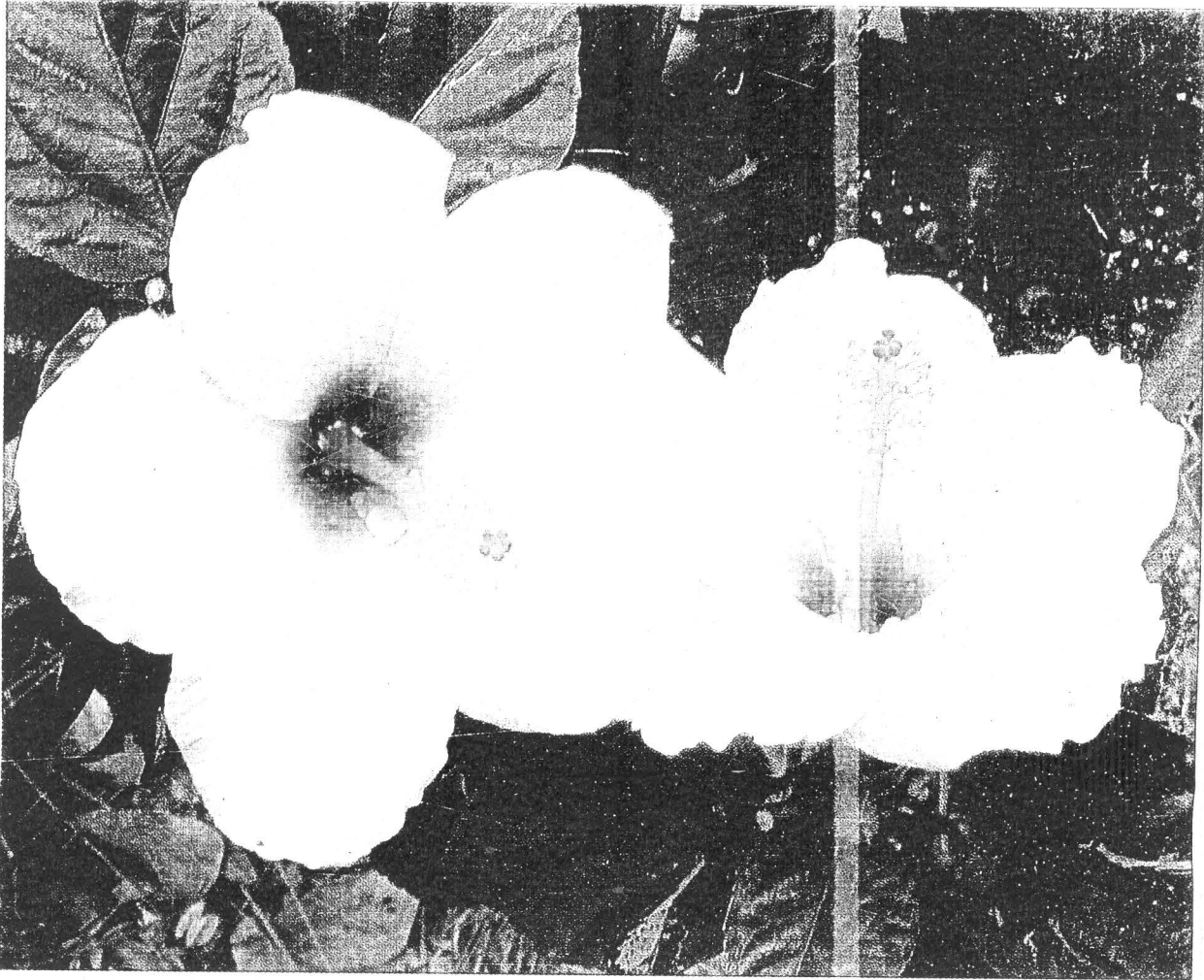
पञ्चत्रिंशं वर्षम्, प्रथमाङ्कः

Vol. 35 No.1

वि० सं० २०७५, फाल्गुनः

28/2/19  
संस्कृतकार्यालयः  
श्रीअरविन्दाश्रमः  
पुदुच्चेरी

Feb-2019



संस्कृतकार्यालयः, श्रीअरविन्दाश्रमः, पुदुच्चेरी

## विषयसूची

कथा:		धारावाहिकलेखा:	
जनकाष्टावक्रयोः संवादः	... 12	शक्ति-सारदम् (नाटकम्)	... 15
सतां स्वभावः	... 12	कठोपनिषद्	... 21
नव्यसृष्टेः उदीयमानं बालपणम्	... 13	देवीमाहात्म्यम्	... 23
परिवर्तनम्	... 30	वेदरहस्यम्	... 26
भस्मासुरः	... 35	नलोपाख्यानम्	... 32
विविधलेखा:		भविष्यपुराणात् वेतालकथा	... 38
केचित् प्रश्नाः तेषां समाधानं च	... 9	प्रत्यक्ष-पद्धत्या संस्कृतम्	... 39
परिहासः	... 37		

प्रकाशकः — मनोजदासगुप्तः, प्रकाशनविभागः, श्रीअरविन्दाश्रमः, पुदुच्चेरी।

सम्पादकः — नन्दः।

वार्षिक-शुल्कम् रू. ३०.०० (त्रिंशत् रूप्यकाणि)

आजीवन-शुल्कम् (विंशतिवर्षपर्यन्तम्) रू. ५००.०० (पञ्चशतं रूप्यकाणि)

प्रकाशनकालः — फरवरी २१, अगस्त १५।

मुद्रकः — स्वाधीनचाटार्जी, श्रीअरविन्दाश्रम-मुद्रणालयः, पुदुच्चेरी।

*Please make DD/Cheque in favour of Sanskrit Karyalaya and send your subscription and letters to: -*

Sanskrit Karyalaya

Sri Aurobindo Ashram, Pondicherry - 605 002

E-Mail: [sanskrit@sriurobindoashram.org.in](mailto:sanskrit@sriurobindoashram.org.in)

Web: <http://sanskrit.motherandsriurobindo.com>

Phone No. (0413) - 2233722

58

# Mainstream

Founded by Nikhil Chakravartty

©

VOL LVII No 6

New Delhi

January 26, 2019

By freedom I mean all-round freedom... This freedom implies not only emancipation from political bondage but also equal distribution of wealth, abolition of caste barriers and social inequities and destruction of communalism and religious intolerance... One thing is to me perfectly clear—life has but one purpose, viz., freedom from bondage of every kind.

*Jawahar Lal Nehru*

(From a speech delivered at the Lahore session of the Punjabi Students' Conference, October 19, 1929)

बिना समय प्रमाण  
प्रकाशकालय और प्रलेखन प्रमाण  
राज्य शीत आओ प्रओ प्रओ  
पुई दिल्ली-16

बिना समय प्रमाण  
प्रकाशकालय और प्रलेखन प्रमाण  
राज्य शीत आओ प्रओ प्रओ  
पुई दिल्ली-16

## On other pages...

- 7 Bapu  
Jawaharlal Nehru
- 9 Netaji on Our Freedom Struggle and India after Independence  
From N.C.'s Writings
- 11 Measuring the Colossus
- 12 The Third Battle of Panipat: Let us examine its True Impact dispassionately  
Basudev Mazumdar
- 13 Survival Crisis and Increasing Relevance of Gandhiji's Ideas for Resolving this Crisis  
Bharat Dogra
- 17 Crossing the Constitutional Line on the Eve of Republic Day  
Badri Raina
- 17 Specifics  
A.K. Das
- 19 Why Farmers and Farm Workers are demanding Special Session of Parliament  
Gopal Krishna
- 23 Bringing Farmers to the Centre-stage  
Suranjita Ray
- 29 Reservation in Judiciary?  
A.K. Biswas
- 35 The Blood-soaked Kashmir: Whether snow or shine, here it is raining bullets and pellets with abandon  
M.A. Sofi
- 37 Escalation in the Kashmir Conflict: Return to Armed Violence as the Dominant Reference-point and Securitisation of the Kashmir Discourse  
M. Ibrahim Wani, Saima Farhad
- 39 Reservation for the Economically Backward: Another Gimmick: The Contradiction of Money versus Merit stands Exposed  
Ram Puniyani
- 41 BOOK REVIEW: Pakistan: An Alternative Perspective  
Gargi Chakravartty
- 45 Focus on Middle East: Turkey at Crossroads: Confronting Domestic and External Challenges in a Turbulent Region  
Purusottam Bhattacharya
- 51 Divine players in Indian Politics  
L.K. Sharma
- 55 A Close Look at Bangladesh Elections  
Mahendra Ved
- 57 Gujarat: Haren Pandya refuses to 'Die'  
R.K. Misra

## Readers, Please Note

This Republic Day Special being a little less than double the size of an ordinary number, there will be no issue of **Mainstream** on February 2, 2019. The next issue will appear on February 9, 2019.

## Protecting Republican Constitution

As we prepare to celebrate our seventieth Republic Day on January 26 this year, a grim situation stares us in the face now that we are approaching our next general elections within a short span of time.

The poll bugle has already been sounded by both the Opposition parties and the ruling BJP and it appears that it would be a no-holds-barred election campaign this time. If the mega-rally by practically all the Opposition parties held precisely a week before the Republic Day in Kolkata's Brigade Parade Ground saw the nation's most prominent, outspoken and articulate leaders in the Opposition camp—joined by a sprinkling of erstwhile BJP stalwarts now firmly opposed to the Prime Minister and his core policies—highlighting the urgent necessity to defeat and dislodge the Modi-Shah duo-led BJP from power, the ruling party's topmost leader today launched in West Bengal's Malda district one of the sharpest attacks on the united Opposition in general and the West Bengal CM in particular while mocking at the proposed *mahagathbandhan's* inability to project anyone with the potential of taking the PM head-on.

At the Malda rally today, Amit Shah, armed with the list of whatever the PM had announced in terms of development programmes in the past four-and-a-half years, sought to present the Union Government's "achievements" in the course of its tenure. But what was missing was a cogent reply to the Opposition's criticism that the tall promises Modi had made in terms of employment generation had remained unfulfilled. This is the primary reason for the disillusionment of the public with the ruling party, apart from the hardships the poor and marginalised as well as ordinary businessmen had been forced to endure mainly due to the thoughtless demonetisation and hastily implemented GST. Besides, neither Shah nor the other BJP leaders have been able to convincingly answer the charge of corruption in the Rafale deal—the bonanza showered on one of the Ambani brothers to the detriment of the HAL public sector enterprise.

A year ago it was written in these columns:

"...what is more alarming is the social unrest that has gripped the nation with mounting assaults on the minorities as an integral part of the majoritarian onslaught which has increased phenomenally since the assumption to power of the present dispensation in 2014. A sense of insecurity thereby prevails among the minorities, especially Muslims..." In the last one year things have definitely worsened on this score.

Today large sections of our people are in the grip of both fear and hatred sown by our current rulers in the minds of the public. Those who came to power in 2014 have only sought to divide the minds instead of uniting them. A similar divisive step is now seen in the effort to legislate the Citizenship (Amendment) Bill as the unfinished agenda of partition. This has already led to disturbances in the North-East and, as some media analysts underscore, this is a "misreading of history, especially of its several and complex trajectories in the North-East which will not be subsumed by an imposed Hindu-Muslim binary".

Clearly those running the nation from the South Block are hell-bent on playing with fire. It would thus be dangerous to allow them to stay on in office. This Republic Day should spur us all to pledge to dislodge them from the seat of power at the earliest, that is, through the coming electoral battle.

That indeed is our bounden duty at present in order to protect our Republican Constitution which, incidentally, is also under threat of being altered beyond recognition.

January 22

S.C.

## SUBSCRIPTION RATES

INLAND	Six Months	One Year	Two Years	Three Years	Life Subscription*	FOREIGN	
						Air Mail (Annual)	Surface Mail (Annual)
Individuals	Rs 300	Rs 600	Rs 1100	Rs 1700	Rs 10,000	Asia \$ 85	All Countries \$ 80
Institutions	—	Rs 700	Rs 1300	Rs 2000	Rs 15,000	Europe \$ 100	
						America \$ 120	

Please send subscription by cheque/Draft/Postal Order/MO to *Perspective Publications Private Limited*, 141, Shahpur Jat (Ground Floor), (Near Asiad Village), New Delhi-110049; ph: 26497188; fax: 26569382; e-mail: [mainlineweekly@yahoo.com](mailto:mainlineweekly@yahoo.com); website: [www.mainstreamweekly.net](http://www.mainstreamweekly.net)

Please add Rs 20 to inland outstation cheques towards bank charges; all remittances to *Perspective Publications Private Limited*.

Postal REGD. No. DL(S)-01/3139/2018-20

# Mainstream

Founded by Nikhil Chakravartty

VOL LVII No 8

New Delhi

February 9, 2019

Handwritten: 28/2/19

Handwritten: प्रलेखन प्रभाग, निकाशालय और प्रलेखन प्रभाग, 10 शी 30 प्रो पठ, ई दिल्ली-16

## Whirligig Politics

NITYANANDA GHOSH

## Mamata emerges as a Focal Point of the National Opposition

ARUN KUMAR

## Union Budget 2019: Cynically Giving Back a Fraction of what has been Taken

L.K. SHARMA

## Sowing Division: Caste is Crucial in Indian Elections

SURAJ SHARMA

## Can the NDA Rise above its Shortcomings before the 2019 Polls?

ARCHISHMAN RAJU

## Solidarity with Venezuela in a Changing World

**FROM N.C.'S WRITINGS**  
**KALPANA DUTT**

# Whirligig Politics

One had known for quite sometime that the 2019 Lok Sabha elections would witness a no-holds-barred campaign with PM Narendra Modi firmly resolved to stay on in power and the combined Opposition determined to oust him from the office he currently holds. The PM's speech in the Lok Sabha and Congress President Rahul Gandhi's address outside Parliament today provided ample testimony of that possibility. Observers anticipate not just that, but increasing prospects of sharp deterioration of the level of debates. Already some leaders from the Treasury Benches have fired the salvo to this effect while attacking TMC supremo and West Bengal CM Mamata Banerjee for her uncompromising struggle against Narendra Modi of late. One of them—a Union Minister—even called her "anarchist" thereby signalling a new low in today's politics.

Meanwhile, Mamata herself has withdrawn her *dharna* in Kolkata over the tussle between the city's Police Commissioner and the CBI after the Supreme Court's ruling on the subject, but warned of similar

action in the Capital in the coming days. The Kolkata events have resulted in varied reactions, with some publications (like *The Times of India*) castigating Mamata in no uncertain terms while simultaneously asserting that the "caged parrot", an euphemism for the CBI, must be freed "in public interest" and "even in the executive's own interest", adding that the BJP needed to "introspect why parties across the spectrum have joined hands against it" and underscoring the fact that the "CBI's enthusiasm in booking Opposition politicians is not matched by its ability to take high-profile cases to their logical conclusion".

Incidentally, one positive development of late has been the VHP's publicly stated decision to hold back its agitation through mass mobilisation for the construction of a Ram temple at Ayodhya for the next four months. That means that in all probability the scenario prior to the Lok Sabha polls would not experience any escalation of the Ram temple dispute that could threaten peace and communal harmony as had happened immediately following the demolition of the Babri Masjid at the end of 1992. That good sense has finally prevailed to await the Supreme Court's decision in the matter is indeed a welcome sign. One fervently hopes there would be no change in the mentality of those desiring the temple at Ayodhya in the days ahead.

However, the 'cow' problem seems to act as a "great equaliser", as *The Indian Express* has opined. In ten years (2007-2016) the BJP Government of Madhya Pradesh had booked 22 persons under the National Security Act for suspected cow slaughter. Since then the BJP has lost the State Assembly elections and currently there is a Congress Government in the State. But the Congress is pursuing the same policy as the BJP in the matter.

Reflecting on this development, which does illustrate the Congress' 'soft-Hindutva' approach and needs to be unequivocally deplored, the same newspaper makes a pertinent observation:

In seeking to electorally encash the cow, the Congress may fail to distinguish itself from its main opponent. And anyway, it must know that the cow is not an infallible investment. (Shivraj Singh) Chouhan had announced the establishment of a Cow Ministry days before the model code of conduct for the Assembly election kicked in, but it did not appear to help his prospects.

Are the Congress leaders, and party President Rahul Gandhi in particular, listening?

February 7

S.C.

## On other pages...

- 3 Mamata emerges as a Focal Point of the National Opposition  
*Nityananda Ghosh*
- 5 MUSINGS: Street-fighter Mamata  
*Humra Quraishi*
- 6 IMPRESSIONS: Why North-East Citizens Rebel  
*T.J.S. George*
- 7 Union Budget 2019: Cynically Giving Back a Fraction of what has been Taken  
*Arun Kumar*
- 12 A Half-hearted Budget in the Name of the Poor  
*S.S. Sangwan*
- 13 Cartoon  
*Jayaraj Vellur*
- 14 Sowing Division: Caste is Crucial in Indian Elections  
*L.K. Sharma*
- 17 Can the NDA Rise above its Shortcomings before the 2019 Polls?  
*Suraj Sharma*
- 29 Demystifying the SC Ruling on Reservation Policy  
*Kamal Singh, Indervir Singh, Chaman Lal*
- 31 Solidarity with Venezuela in a Changing World  
*Archishman Raju*
- 32 COMMUNICATION: Demise of George Fernandes  
*From N.C.'s Writings*
- 33 Kalpana Dutt
- 34 Communal Frenzy and Abuse of Religion  
*Nilofar Suhrawardy*

## SUBSCRIPTION RATES

INLAND

	Six Months	One Year	Two Years	Three Years	Life Subscription*	Air Mail (Annual)	Surface Mail (Annual)
Individuals	Rs 300	Rs 600	Rs 1100	Rs 1700	Rs 10,000	Asia \$ 85	All Countries \$ 80
Institutions	—	Rs 700	Rs 1300	Rs 2000	Rs 15,000	Europe \$ 100	
						America \$ 120	

\* Life Subscription is available only in India

FOREIGN

Please send subscription by cheque/Draft/Postal Order/MO to *Perspective Publications Private Limited*, 141, Shahpur Jat (Ground Floor), (Near Asiad Village),

New Delhi-110049; ph: 26497188; fax: 26569382; e-mail: [mainlineweekly@yahoo.com](mailto:mainlineweekly@yahoo.com); website: [www.mainstreamweekly.net](http://www.mainstreamweekly.net)

All remittances to *Perspective Publications Private Limited*.  
Postal REGD. No. DL(S)-01/3139/2018-20

62

Price: Rs 15

# Mainstream

Founded by Nikhil Chakravartty

VOL LVII No 9

28/1/19

New Delhi

February 16, 2019

बुकिंग प्रमाण  
पुस्तकालय और प्रलेखन प्रमाण  
20 10 30 40 40  
16

## Statesmanship: Need of the Hour

PARTHA S. GHOSH

### The Bangladeshisation of Indian Politics

APRATIM MUKARJI

### The games that Sri Lankans play

SHAMSHER ALAM

### Understanding Socio-political Assertion of Muslims in India Today

D.M. DIWAKAR

### Illusionary Directionless Populist Interim Budget

BADRI RAINA

### EVM Debate

L.K. SHARMA

### Rising Roar of Faux Faith in Poll-bound India

**FROM N.C.'S WRITINGS**

**• TODAY'S IMPERATIVE**

# Statesmanship: Need of the Hour

What happened today in Kashmir has once again brought back the issue of India-Pakistan confrontation on Kashmir to the forefront. The sheer magnitude of the terror strike in Avantipora in the Pulwama district, about 20 kilometres south of Srinagar, on the Jammu-Srinagar highway should make the authorities alarmed over the extent of alienation of the local Kashmiris from the Government of India and the

security forces: from all available accounts of what took place this afternoon it is clear that an explosive-laden SUV rammed into a CRPF convoy on the highway and that resulted in as many as 44 CRPF jawans being killed (the figure of the dead is in all likelihood to rise) while numerous others have been injured. Such a terrorist attack has not taken place in the Valley for a long time—this is the biggest such assault in 15 years—and it was carried out by a local militant, Adil Ahmed Dar, reportedly working on behalf of the Jaish-e-Mohammad's Afzal Guru Squad.

This incident has led to government functionaries, including Central Ministers, directly calling for retaliation and they have been fully backed by certain influential news channels known for their anti-Pakistan rhetoric. While the incident has caused legitimate resentment among large sections of the public, enhancing confrontation with Pakistan can only worsen the security situation in our region. While the Pakistani hand behind the incident cannot be overlooked what needs to be understood at the same time is that trying to search for an alternative to negotiation and dialogue with the Kashmiri public as well as Pakistan on the basic and vital questions related to Kashmir can lead one only into a blind alley. To say that a "war-like situation" has been created due to today's terror strike, as a Minister of State in the Narendra Modi dispensation has averred, is to play into the hands of those who, both in India and abroad, want to see the two South Asian neighbours engaged in an armed conflict. That eventuality must be avoided at all cost since its consequence would be disastrous for both the countries (armed with nuclear weapons) and their peoples.

On the face of it, the incident has been caused due to a massive intelligence failure as the Congress has correctly observed. That needs to be addressed immediately. Simultaneously urgent steps must be taken to proactively tackle the problem of public alienation from the government, that is, the one at the Centre in New Delhi as J&K is under Central Rule.

The myopic leaders running the country from the nation's Capital could take the wrong step of escalating tensions on the border with the objective of "teaching a lesson" to our recalcitrant western neighbour. That indeed would be playing with fire. Any such move is fraught with not just uncertainty but, more importantly, grave danger.

Statesmanship alone can help us find the path forward in this complex scenario.

February 14

S.C.

## On other pages...

- 3 The Bangladeshisation of Indian Politics  
*Partha S. Ghosh*
- 4 The games that Sri Lankans play  
*Apratim Mukarji*
- 6 Appropriating an Icon: RSS Celebrates Netaji Subhash Chandra Bose's Birthday  
*Ram Puniyani*
- 7 TRIBUTE: George Fernandes—A Lifelong Rebel and Coalition-builder  
*Shambhu Shrivastava*
- 9 Spectacular CBI Move in Kolkata: Reading the Social Text  
*Arup Kumar Sen*
- 10 Living in the Past  
*M.K. Bhadrakumar*
- 11 Understanding Socio-political Assertion of Muslims in India Today  
*Shamsher Alam*
- 15 Illusionary Directionless Populist Interim Budget  
*D.M. Diwakar*
- 19 Narendra Modi is the Actual Accidental PM  
*Sandeep Pandey*  
*From N.C.'s Writings*
- 21 Today's Imperative
- 23 EVM Debate: Securing Faith in the Basic Institution of Free and Fair Franchise: The election watchdog had better not be found sleeping while thieves come and steal the mandate  
*Badri Raina*
- 24 Do Not Undermine Parliament, Please  
*D.K. Giri*
- 26 Value System Changes Needed for a Protective World  
*Bharat Dogra*
- 27 Russia-Ukraine: Brotherly Ties Turning into Hostilities. How and Why?  
*R.G. Gidadhubli*
- 29 Trump's Pick of Strong Men  
*Badri Raina*
- 30 Triple Talaq Bill: Limits, Ambiguities and Politics  
*Ananya Pathak*
- 31 Rising Roar of Faux Faith in Poll-bound India  
*L.K. Sharma*
- 33 In the Aftermath  
*S.C.*

## SUBSCRIPTION RATES

INLAND						FOREIGN		
	Six Months	One Year	Two Years	Three Years	Life Subscription*		Air Mail (Annual)	Surface Mail (Annual)
Individuals	Rs 300	Rs 600	Rs 1100	Rs 1700	Rs 10,000	Asia	\$ 85	All Countries \$ 80
Institutions	—	Rs 700	Rs 1300	Rs 2000	Rs 15,000	Europe	\$ 100	
						America	\$ 120	

\* Life Subscription is available only in India  
Please send subscription by cheque/Draft/Postal Order/MO to *Perspective Publications Private Limited*, 141, Shahpur Jat (Ground Floor), (Near Asiad Village), New Delhi-110049; ph.: 26497188; fax: 26569382; e-mail: [mainlineweekly@yahoo.com](mailto:mainlineweekly@yahoo.com); website: [www.mainstreamweekly.net](http://www.mainstreamweekly.net)  
All remittances to *Perspective Publications Private Limited*.

Postal REGD. No. DL(S)-01/3139/2018-20



## Probing Queries, Outrageous Outburst

An element of uncertainty hovers over the country as one writes these lines. A week has passed since the horrific terror strike in Pulwama, J&K. That happened on February 14. Today is February 21. The entire country stood by the Union Government soon after the terror attack, the worst in the border State that resulted in the deaths of as many as 40 CRPF jawans. Today on the seventh day after the attack the Opposition parties have come out with probing questions on the intelligence and security failures that led to the terror strike, and what the PM was doing immediately following that dastardly incident. This has triggered angry reaction from the BJP accusing the main Opposition party of not just politicising the issue but even demoralising the security forces. Interestingly the Congress is being attacked by members of a party whose ideological forefathers had all along helped the

British and kept themselves out of the freedom struggle, especially during the 'Quit India' movement.

In the meantime the Union Government's total silence on the violence on sections of the Indian populace, notably the Kashmiris, in different parts of the country has compelled the Kashmiri leaders, like the National Conference's Omar Abdullah, a former J&K CM, to assail such reprehensible actions and denounce these in unambiguous terms.

However, most unfortunate and condemnable are the public pronouncements of Meghalaya Governor Tathagata Roy. Only the other day he made an outrageous comment. Asking the people not to visit Kashmir, not to go to Amarnath for the next two years, not to buy articles from the Kashmir emporia or Kashmiri tradesmen, his terse message was: "Boycott everything Kashmiri." In the wake of the controversy he has raised, a spokesman of his party has sought to explain away his remarks as being purely his "personal opinion". This is totally unacceptable. Whatever one's personal views may be, as long as a person holds a constitutional office, he cannot publicly air "personal" opinions that go against the official policy of the government or are inconsistent with the requirements of the office he is holding.

"Boycott everything Kashmiri" is not the policy of the government, even of the government run by the BJP, the party to which Roy belongs. The Indian state's well-known position is that Jammu and Kashmir, including that part of Kashmir which is under the illegal occupation of Pakistan, is an integral part of India. The Kashmiris are very much Indian. A person holding a constitutional office like that of a Governor cannot give a call to boycott the people of an integral part of India. To put it euphemistically, what Roy has said goes against the policy of the government and the interests of the country. Not to put too fine a point on it, the outrageous "personal opinion" that he has expressed publicly, questions his eligibility to the office he occupies.

But till date Tathagata has not been pulled up, leave aside being shown the door. The President too has adopted the role of an onlooker in the matter. This is also unacceptable. He needs to be sacked forthwith.

As we go to press, news has just come that India has taken the decision to stop supplying water from Chenub, Beas and Ravi to Pakistan. Needless to underline, this will cause immense hardship to the Pakistani people and further enhance our bilateral tensions with Pakistan.

February 21

Analyst

### On other pages...

- 3 Pulwama Attack: PIPFPD Calls for Peace  
4 Thinking beyond the Immediate  
S.G. Vombatkere  
From N.C.'s Writings  
5 Kashmir: Nearing Zero Hour  
6 For How Long would Kashmiris Suffer?  
Aijaz Ahmad Turrey  
7 Chest-thumping and War-mongering must give way to Trust, Peace and Friendship  
Sandeep Pandey  
9 Union Budget 2019: Unethical Political Stance  
Anup K. Sinha  
11 The Subversion of Systems is More Fatal than Scams  
Badri Raina  
13 Agrarian Crisis and its Resolution  
S.P. Shukla, Jaya Mehta, Vineet Tiwari  
23 Bulandshahr: Unravelling the Anatomy of a Riot  
Ram Puniyani  
24 Two Phenomena of 'Modi Era': Virtual World and Unabated Communal-Caste Conflicts  
Prem Singh  
26 Land Acquisitions in India: A State of Exception  
Arup Kumar Sen  
26 Old Age  
Badri Raina  
27 Crimes against Women in Punjab, Haryana and Himachal Pradesh  
Ranbir Singh, Sonia Aharwala  
28 Crucial Concept of Earth's Survival Crisis  
Bharat Dogra  
29 What ails the Public Distribution System?  
Santosh Kumar Biswal  
31 Resilient Hinduism has Endured Upheavals  
L.K. Sharma

### SUBSCRIPTION RATES

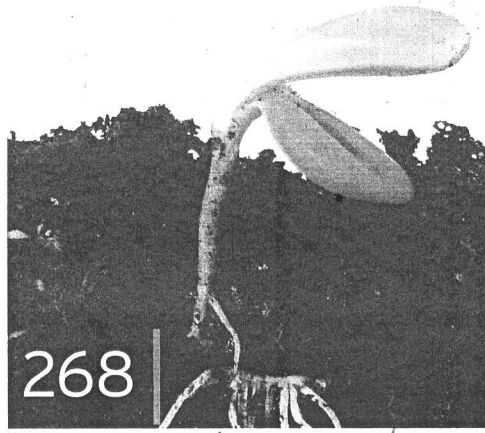
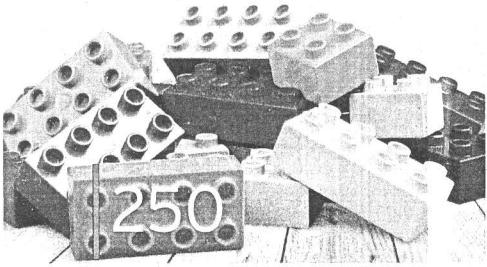
INLAND	Six Months		One Year		Two Years		Three Years		Life Subscription*		FOREIGN	
	Individuals	Institutions	Rs 300	Rs 600	Rs 1100	Rs 1700	Rs 2000	Rs 10,000	Rs 15,000	Air Mail (Annual)	Surface Mail (Annual)	
				Rs 700	Rs 1300					Asia \$ 85	All Countries \$ 80	
										Europe \$ 100		
										America \$ 120		

\* Life Subscription is available only in India  
Please send subscription by cheque/Draft/Postal Order/MO to *Perspective Publications Private Limited*, 141, Shahpur Jat (Ground Floor), (Near Asiad Village), New Delhi-110049; ph: 26497188; fax: 26569382; e-mail: [mainlineweekly@yahoo.com](mailto:mainlineweekly@yahoo.com); website: [www.mainstreamweekly.net](http://www.mainstreamweekly.net)  
All remittances to *Perspective Publications Private Limited*.

Postal REGD. No. DL(S)-01/3139/2018-20

## CONTENTS

<b>VASUDHA SHARMA AND RAVINDER KAUR</b>	<i>Dam Induced Displacement and Resettlement of Oustees: A Rhetoric (A Case of Ranjit Sagar Dam, Punjab)</i>	1
<b>RITESH RAVI AND AMIT GAURAV</b>	<i>Information and Communication Technology: A Different Landscape of Banking and Financial Inclusion</i>	23
<b>NEHA SHARMA</b>	<i>Financial Inclusion through Digital India: 41 Cases of DBT and PMJDY in Chandigarh</i>	41
<b>BUSHRA BEEGOM R K AND SAMSEER R H</b>	<i>From Human Ecology to Impoverishment Risks: 59 A Critical Analysis of the Two Major Theories of Development Induced Displacement</i>	59
<b>TALWAR SABANNA</b>	<i>Migration, Remittances and Utilisation: Myths and Reality</i>	73
<b>SANDEEP KUMAR</b>	<i>The Process of Centralisation and Marginalisation through Goods and Services Tax</i>	87
<b>ANIL K YADAV AND YOGESH KUMAR</b>	<i>Growth, Employment and Output Generation In MSME in India: An Analysis</i>	97
<b>ANUPA JACOB</b>	<i>Cochin SEZ: A Study from the Perspective of Competitiveness and Labour Standards</i>	113
<b>DOCUMENTS</b>		
(National conference on "Towards Peace, Harmony and Happiness: Transition to Transformation")		
<b>M HAMID ANSARI</b>	<i>Valedictory Address</i>	129
<b>MANMOHAN SINGH</b>	<i>Presidential Address</i>	131
<b>MURLI MANOHAR JOSHI</b>	<i>Keynote Address</i>	165



Mathematics Teacher

# contents

Volume 112, Number 4, January/February 2019

## features

### 250 STEAMing Up Linear Functions

Kelly W. Remijan

These four activities connect mathematics to science, technology, engineering, and art.

### 258 Finding Meaning in the Quadratic Formula

Thomas G. Edwards and Kenneth R. Chelst

Connecting the formula to the graphic representation of quadratic functions makes the mathematics meaningful to students.

### 262 Building the Optimal Learning Environment for Mathematics

Melinda (Mindy) S. Eichhorn, Peter J. DiMauro, Courtney Lacson, and Barbara Dennie

Teachers can use Universal Design for Learning (UDL) in their math classroom to anticipate barriers and engage students.

### 268 Building Momentum by Starting Small

Cassandra R. Seiboldt, Lorraine M. Males, and Joshua R. Males

A university mathematics teacher educator and a math department chair reflect on various assignments.

### 274 Connecting Mathematics with World Heritage

Craig Russell

Use trigonometry to improve your students' global literacy.

### 288 Supporting English Learners in the Math Classroom: Five Useful Tools

Manqian Zhao and Karen Lapuk

Five ideas can help teachers implement teaching strategies.

### 294 Looking For and Using Structural Reasoning

Casey Hawthorne and Bridget K. Druken

Explore quadratics and engage students.

## on the cover

The metaphorical kettle is on the stove top and the STEAM is rising. Enter Kelly Remijan's classroom where science, technology, engineering, art, and architecture interact in the name of mathematics. Remijan provides four activities that integrate STEAM topics into the mathematics curriculum. Then turn to page 274 and learn how Craig Russell involves UNESCO World Heritage sites in some of his trigonometry lessons. We hope these ideas will help to heat up your classroom.

COVER: TOA55/GETTY IMAGES

Handwritten text in Hindi: "मिशन प्रमाणिकता और प्रलेखन प्रणाली" and "नई दिल्ली-16".

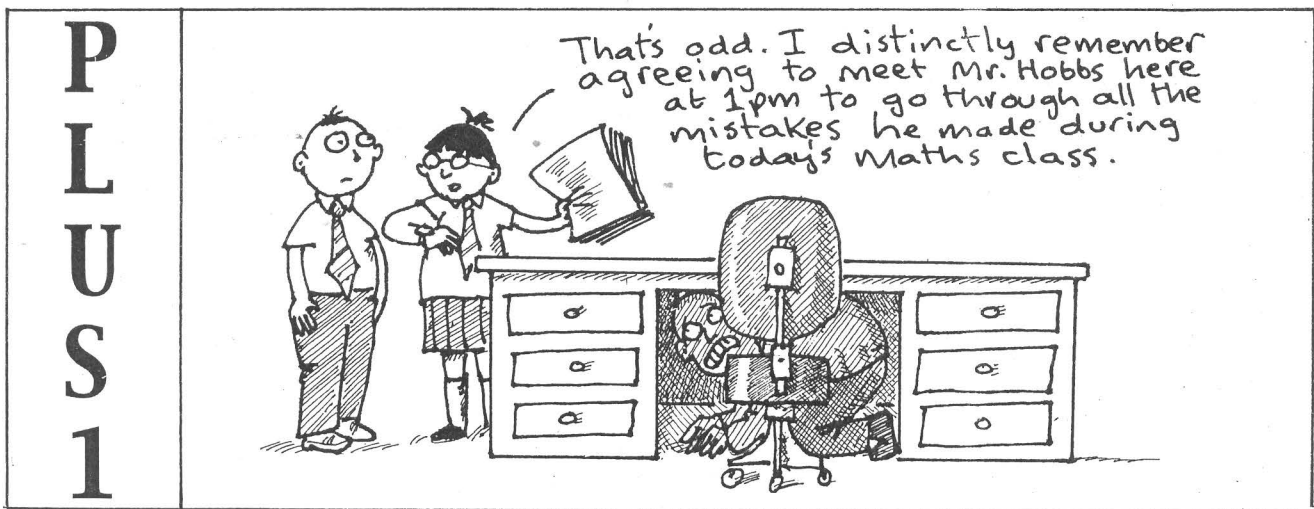


NATIONAL COUNCIL OF TEACHERS OF MATHEMATICS

ARTISTEER/GETTY IMAGES; KATELEIGH/GETTY IMAGES; BRIANA JACKSON/GETTY IMAGES

# Contents MT264

<b>Forewords</b> by Alf Coles	4	<b>Mathematics education in a time of crisis</b>	31
<b>Danny's diary: A lesson on logs</b>	5	by Alf Coles	
by Danny Brown		<b>A story of incarceration motivates new</b>	35
<b>What do we understand by "excellent"</b>	7	<b>conversations: Developing mathematics</b>	
<b>mathematics teaching?</b>		<b>teaching for a future humanity</b>	
by Judith McCullouch		by Nataly Chesky, John Lupinacci	
<b>Arranging addends puzzles</b>	9	and Mark Wolfmeyer	
by Daniel Scher		<b>Mathematical reasoning: An aim for</b>	38
<b>Using tokens to teach directed numbers</b>	13	<b>all students</b>	
by Clare Hill		by Rachel Helme	
<b>Projective planes</b> by Bob Burn	17	<b>Inventing a knot theory for</b>	41
<b>Pinel's polyhedral</b> by Adrian Pinel	20	<b>eight year olds?</b> by Dan Ghica	
<b>General Council report</b> by Sandie Blakesley	24	<b>Introducing Sam Walters</b>	43
<b>Thinkers: A collection of activities</b>	26	<b>In conversation with Alistair Bissell</b>	44
<b>to provoke mathematical activity</b>		by Laurinda Brown	
<b>It's mentoring, but not as we know it</b>	28	<b>From the archive</b>	48
by Rebecca Turvill		Teaching takes place in time. Learning	
		takes place over time by Pete Griffin	
		<b>In-sight</b> by Shane Johnstone	50



Plus 1 drawn by Harry Venning.

# mathematics

teaching in the **MIDDLE SCHOOL**



NATIONAL COUNCIL OF  
TEACHERS OF MATHEMATICS

Vol. 24, No. 4,  
January/February 2019

## FEATURES

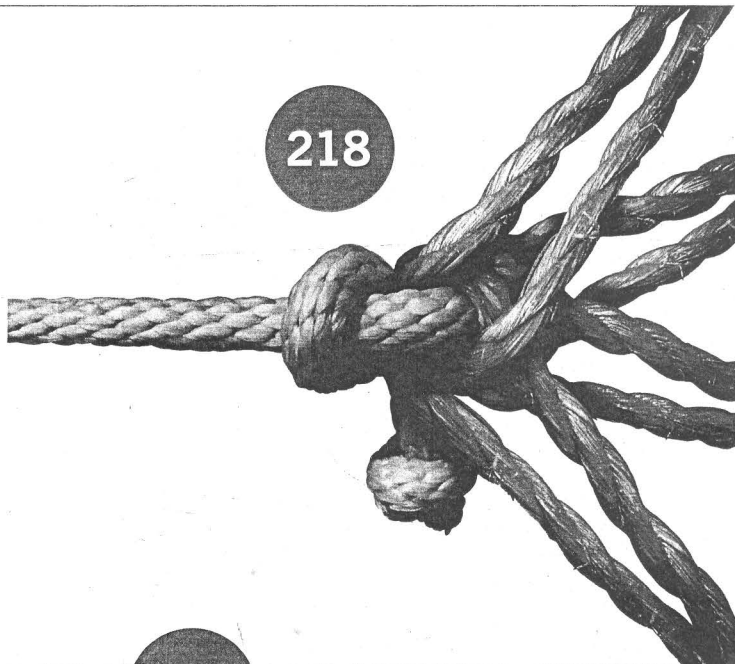
**202** **What, How, Who: Developing Mathematical Discourse**  
*Kelley Buchbeister, Christa Jackson, and Cynthia E. Taylor*  
A collaborative classroom, an open-ended problem, and a what-how-who structure can build students' reasoning skills.

**210** **Stop the Silence! How to Create a Strategically Social Classroom**  
*Michael Tapee, Tammy Cartmell, Tammy Guthrie, and Laura B. Kent*  
By orchestrating social interactions, students learn from one another about data and measures of center.

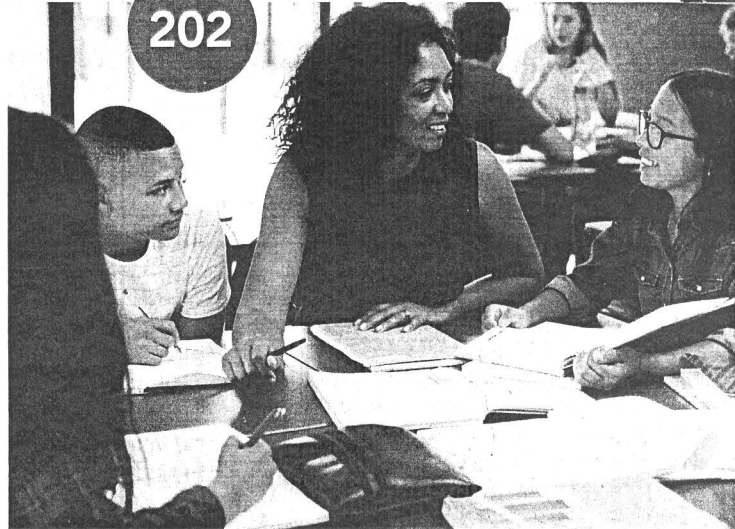
**218** **Designing Mathematical Interactions for English Learners**  
*Hairwen Chu and Leslie Hamburger*  
Five types of engaging peer-interaction structures can support English learners as they make sense of mathematics and explore important mathematical relationships.

**226** **Making Math Social with Dialogue Protocol**  
*Hagit Sela, Nicole Davis, and Jennifer Hulse*  
Teachers reflect on how three dialogue protocols can promote meaningful and efficient communication and learning through social interactions.

**234** **Extreme Word Problems: Interweave Student Imagination with Math**  
*Angela Marie Frabasilio*  
Let students find the connecting thread to create, illustrate, and share word problems to bridge school math and real-life math.



218



202

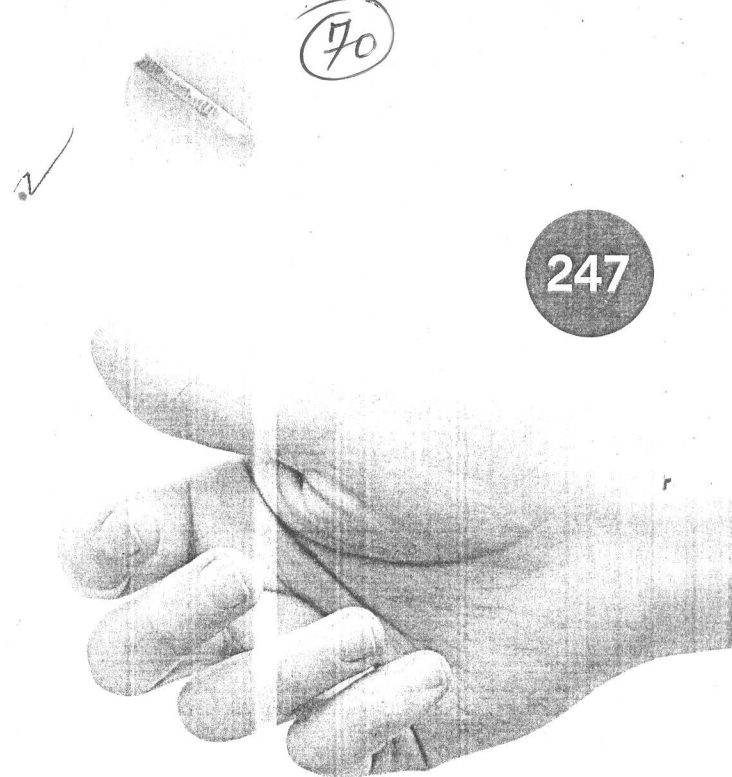
**242** **MTMS Favorites: "Productive Struggle for All: Differentiated Instruction"**  
*DeAnn Huinker*  
Members of the Editorial Panel spotlight articles from the twenty-three-year history of *MTMS*. In this offering, the takeaway is the importance of supporting productive struggle using cognitively demanding tasks.

Handwritten text in Hindi: "श्री लक्ष्मी प्रसाद शिक्षणालय और प्रलेखन केंद्र, 310 रोड 300 40 40, 16 दिल्ली-16"

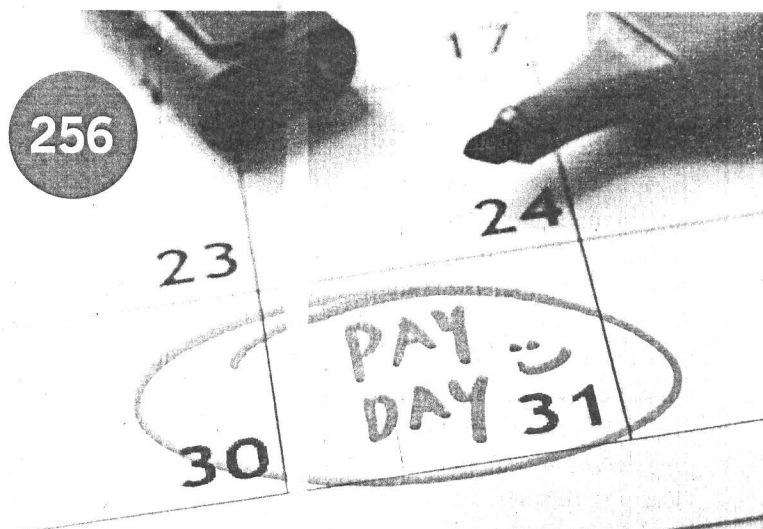
COVER: CHOREOGRAPH, GETTY IMAGES; ROPES, WILDPXEL, GETTY IMAGES; CLASSROOM, MONKEYBUSINESSIMAGES, GETTY IMAGES

## DEPARTMENTS

- 196 **By Way of Introduction**  
Making Math Social  
*Aaron Rumack and Rebecca Robichaux-Davis*
- 197 **Solve It**  
Triangles on a Geoboard  
*Annie Perkins and Christy Pettis*
- 198 **Cartoon Corner**  
Boxing in Some Math  
*Leslie Nielsen*
- 200 **Palette of Problems**  
*Anna F. DeJarnette and Stephen Phelps*
- 232 **Call for Manuscripts:**  
*Mathematics Teacher: Learning and Teaching, Pre-K-12*
- 243 **Quick Reads**  
Making Time for Book Study  
*Sarah A. Roller, Diona Cozzolino, Adrienne King, and Lory Schieler*
- 247 **Mathematical Explorations**  
Discovering Patterns in Pascal's Triangle  
*Marilyn Howard*
- 255 **Window on Resources**
- 256 **Math for Real**  
Equal Pay Day  
*E. Fanny Sosenke*

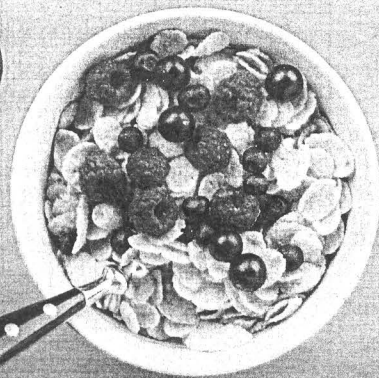


247



256

198



## looking ahead to March *MTMS*

- “Using Disagreement to Get Students Talking,” by Michelle Stephan and Jennifer Smith
- “NCTM’s *Catalyzing Change in High School Mathematics: Our Role in the Middle*,” by Sarah B. Bush
- *MTMS* Favorites: “A Framework for Analyzing Geometric Pattern Tasks,” by Rebecca R. Robichaux-Davis



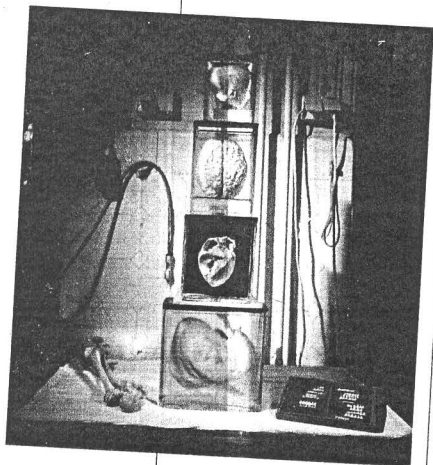
# CONTENTS

## On the Cover

This composite photo shows highly magnified, functioning spinal cord tissue (background) that's micro-engineered onto a chip, which researchers can use to study disease.

CRAIG CUTLER (HAND WITH CHIP); SAMUEL SANCES, CEDARS-SINAI (BACKGROUND)

## SPECIAL ISSUE: MEDICINE

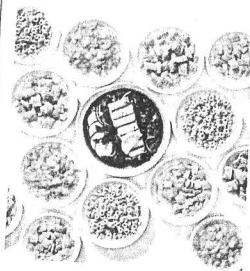


# 10

THROUGH THE LENS

**Doctor Photographer**  
Choosing between two consuming vocations.  
BY MAX AGUILERA-HELLWEG

# 12

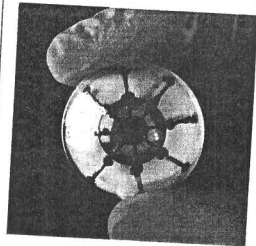


INTERVIEW

**Watch What—and When—You Eat**  
Timing is everything.  
BY MICHAEL ROIZEN AND MICHAEL GRUPAIN

DATA SHEET

**Health Care Spending**  
High costs don't always yield better outcomes.  
BY ALBERTO LUCAS LÓPEZ AND RYAN T. WILLIAMS



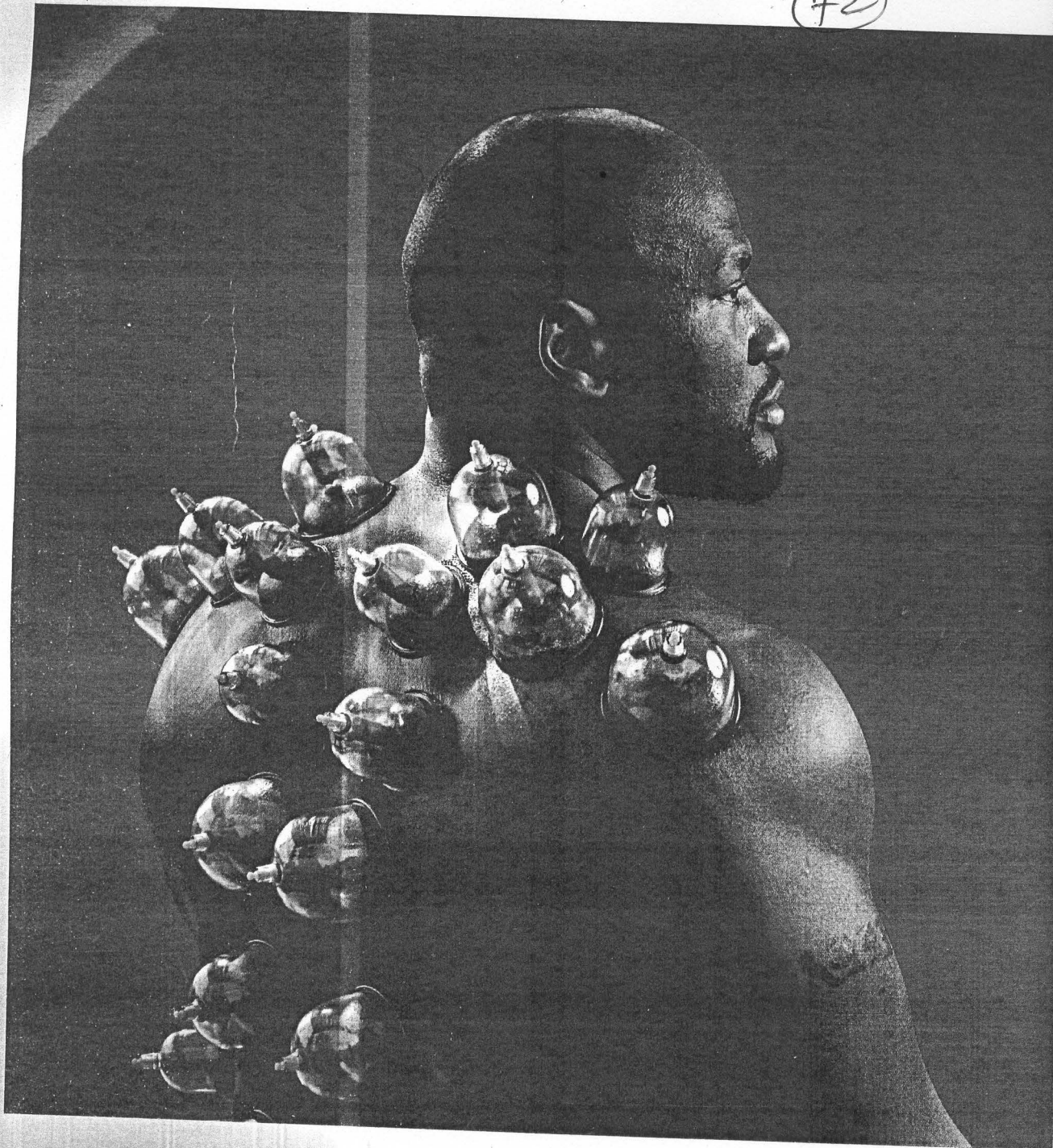
# 20

THE BIG IDEA

**The Future of Medicine**  
Ever present and hyperconnected, the high-tech medical treatments of the future will focus on well-being and prevention.  
BY DANIEL KRAFT

ALSO

- Cutting-Edge Music to Boost Premies' Brains
- Selfies Look for Cancer
- Contact Lenses May Track Glucose Levels
- 3D Printers Manufacture Missing Limbs
- Robot Rehab Coaches



FEATURES

**Every Body Is Unique**

Built on stunning advances in gene research and data mining, precision medicine devises treatments tailored to a patient's specific biochemical makeup. This new approach has the potential to upend decades of medical practice.

BY FRAN SMITH  
PHOTOGRAPHS BY  
CRAIG CUTLER

P. 36

**The Immortal Corpse**

An elderly woman donated her body to a researcher's ambitious project. He froze it, sliced it 27,000 times, and took pictures. The result: a virtual cadaver that can be examined by medical students and help them understand how, in life, she was put together.

BY CATHY NEWMAN  
PHOTOGRAPHS BY  
LYNN JOHNSON

P. 58

**The Secrets of Chinese Medicine**

Modern science examines ancient remedies.

BY PETER GWIN  
PHOTOGRAPHS BY  
FRITZ HOFFMANN

P. 82

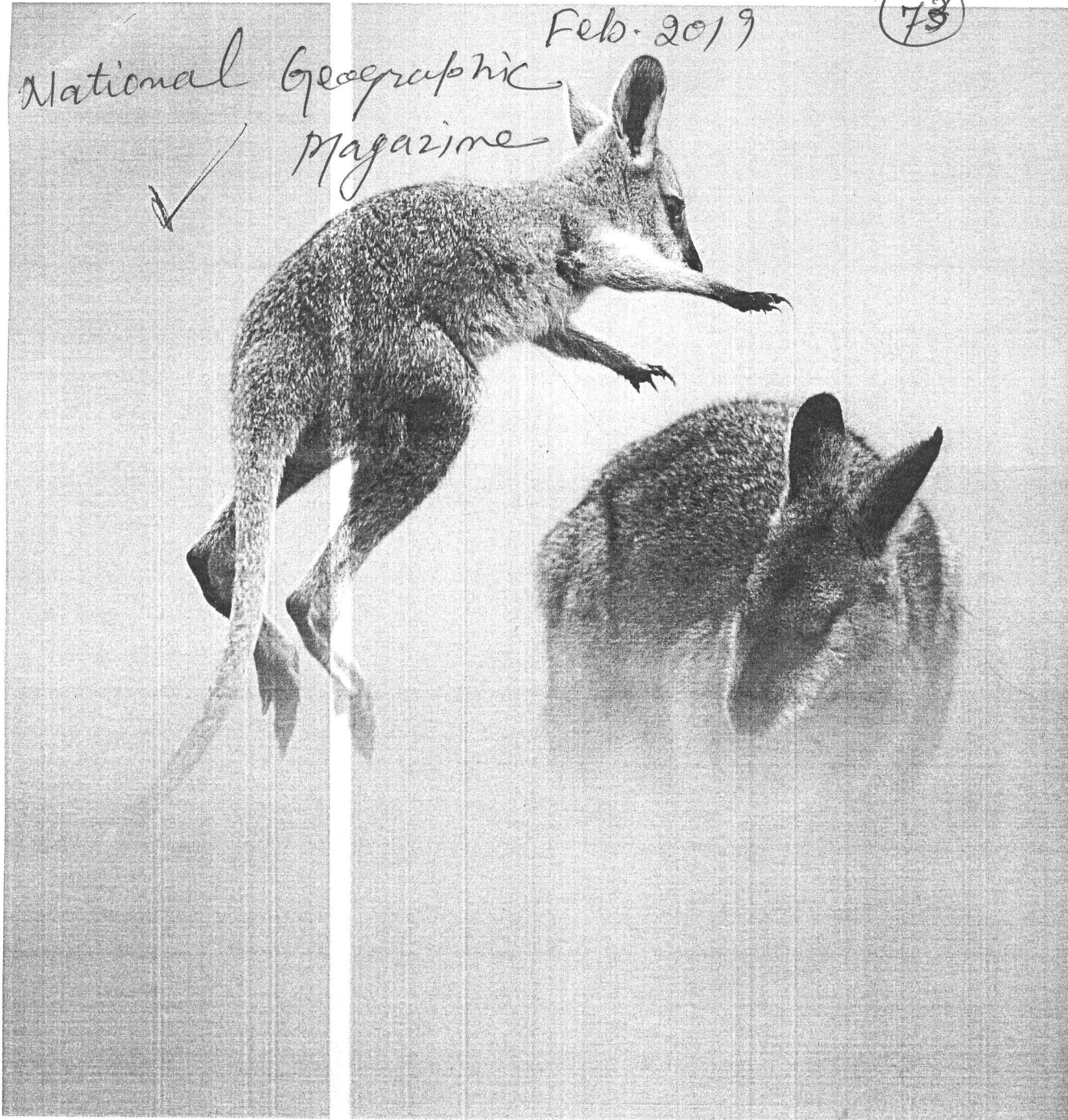
**The Truth About Maternal Mortality**

Rates are relatively high for American women.

BY RACHEL JONES  
PHOTOGRAPHS BY  
LYNSEY ADDARIO

P. 108

National Geographic Magazine



FEATURES

**Unthinkable Sacrifice**

Mystery shrouds child killings some 500 years ago in what's now Peru.

BY KRISTIN ROMNEY  
PHOTOGRAPHS BY  
ROBERT CLARK

..... P. 32

**The White Gold Rush**

Lithium is key to making batteries. Bolivia has it in abundance.

BY ROBERT DRAPER  
PHOTOGRAPHS BY  
CÉDRIC GERBEHAYE

..... P. 58

**Silicon Valley Grows Up (Sort Of)**

The tech mecca looks at the costs of success.

BY MICHELLE QUINN  
PHOTOGRAPHS  
BY LAURA MORTON

..... P. 82

**Solo**

Alex Honnold is famous for climbing formidable rock faces without using ropes. But El Capitan?

BY MARK SYNNOTT  
PHOTOGRAPHS BY  
JIMMY CHIN ..... P. 100

**A National Symbol —But Also a Pest?**

Australia grapples with a kangaroo issue.

BY JEREMY BERLIN  
PHOTOGRAPHS BY  
STEFANO UNTERTHINER

..... P. 110

74

# CONTENTS

## On the Cover

The Milky Way glows above one of the 64 antennas of MeerKAT, a supersensitive telescope that scans the sky for radio signals. It's located in South Africa's Northern Cape Province.

SAREL VAN STADEN AND MARYNA COTTON; PANORAMA COMPOSED OF THREE IMAGES

## EMBARK

# 14

### THE BIG IDEA

#### A Wake-Up Call on Water Quality

One-quarter of Americans drink water from systems that aren't safe.

BY RHEA SUH

### GENIUS

#### Safer. Cheaper. Greener.

Engineer Leslie Dewan wants to reinvent nuclear energy.

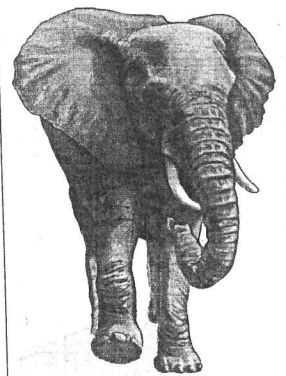
BY RACHEL HARTIGAN SHEA



### ALSO

A Mighty New Dinosaur

## EXPLORE



# 30

### DECODER

#### Evolved to Crack

Scientists are learning more about how elephants get the creases in their skin and why those crevices are so important to them.

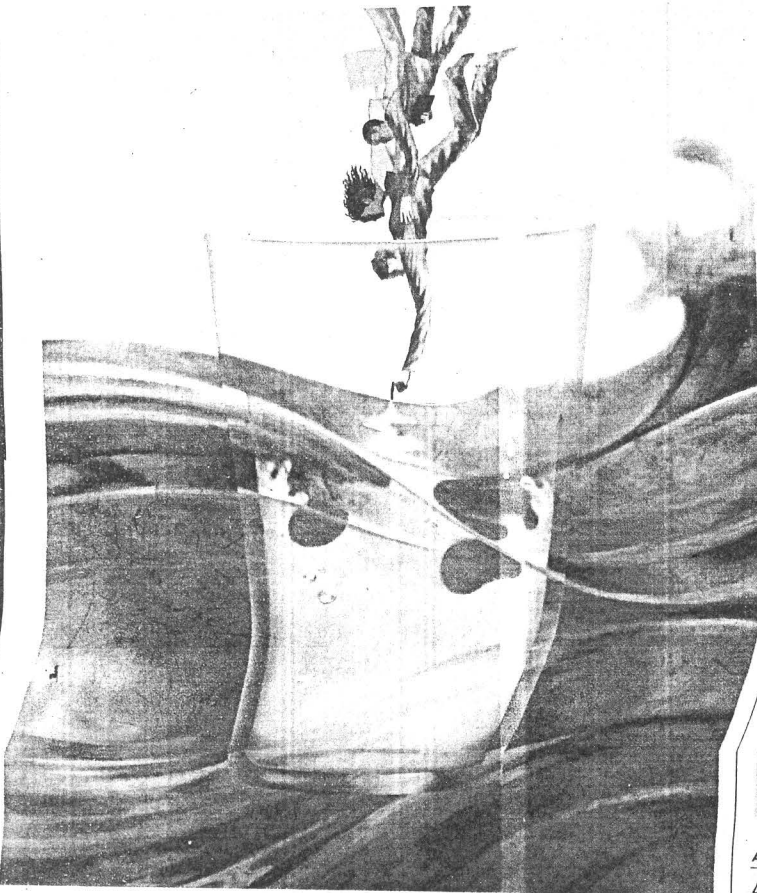
BY MONICA SERRANO

### THROUGH THE LENS

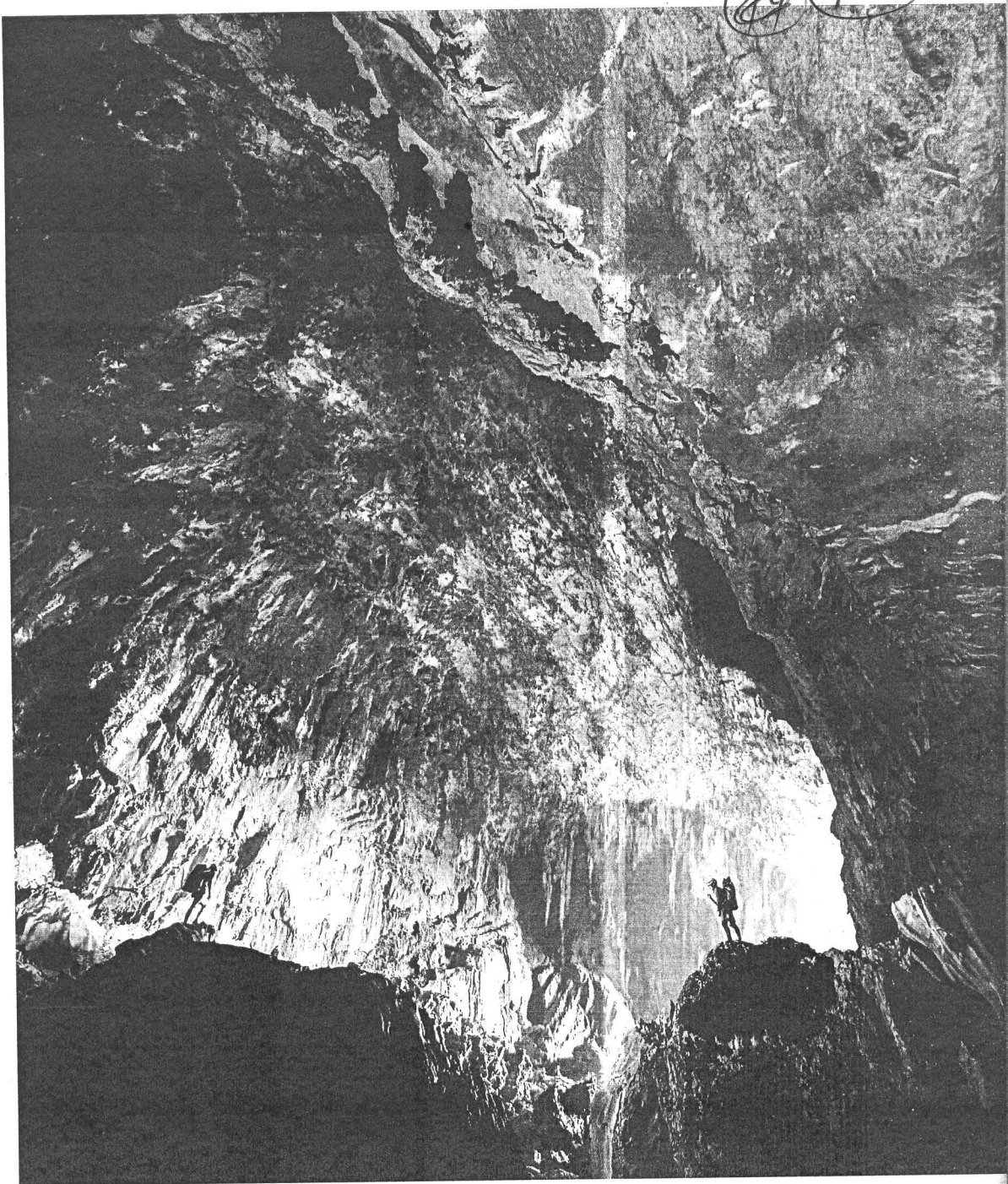
#### Strange Reflections

During the annual flood season in Venice, buildings appear as distorted images on the water. Within those reflections, a photographer finds bizarre creatures—and also solace.

BY JODI COBB



76 75



FEATURES

**Who's Out There?**

The big existential question is no longer, Is there life beyond Earth? It's a pretty sure bet there is.

The question now is, How do we find who—or what—is alive out there? And we are getting really close to answering it.

BY JAMIE SHREEVE  
PHOTOGRAPHS BY  
SPENCER LOWELL  
ART BY DANA BERRY

.....P. 36

**No Way Out**

Criminal gangs have fractured El Salvador.

BY JASON MOTLAGH  
PHOTOGRAPHS BY  
MOISES SAMAN AND  
ADAM FERGUSON

..... P. 64

**▲ Borneo's Vast Underworld**

Malaysia's Mulu caves boast chambers that are millions of years old.

BY NEIL SHEA  
PHOTOGRAPHS BY  
CARSTEN PETER

..... P. 88

**Treehoppers**

These mini-monsters are masters of disguise.

BY DOUGLAS MAIN  
PHOTOGRAPHS BY  
JAVIER AZNAR  
GONZÁLEZ DE RUE

.....

**Rituals of Rebellion**

The Americas' carnivals honor revelers' roots.

BY JACQUELINE CH  
PHOTOGRAPHS BY  
CHARLES FRÉGER

.....

176

**New Scientist**

**Management**

**Executive chairman** Bernard Gray  
**Chief executive** Nina Wright  
**Finance director** Jenni Prince  
**Chief technology officer** Chris Corderoy  
**Marketing director** Jo Adams  
**Human resources** Shirley Spencer  
**Non-executive director** Louise Rogers

**Publishing and commercial**

**HR co-ordinator** Serena Robinson  
**Facilities manager** Ricci Welch  
**Executive assistants** Sarah Gauld, Lorraine Lodge  
**Receptionist** Alice Catting

**Display advertising**

**Tel** +44 (0)20 7611 1291  
**Email** displayads@news scientist.com

**Commercial director** Chris Martin  
 Lynne Garcia, Richard Holliman, Justin Viljoen, Henry Vowden, Helen Williams

**Recruitment advertising**

**Tel** +44 (0)20 7611 1204  
**Email** nssales@news scientist.com  
**Recruitment sales manager** Mike Black  
 Isabelle Cavill, Nicola Cubeddu  
**Key account manager** Viren Vadgama  
**US sales manager** Jeanne Shapiro

**Marketing**

**Head of marketing** Lucy Dunwell  
 David Hunt, Nashitha Suren, Chloe Thompson

**Web development**

Maria Moreno Garrido, Tom McQuillan, Amardeep Sian

**New Scientist Live**

**Tel** +44 (0)20 7611 1206  
**Email** live@news scientist.com  
**Events director** Adrian Newton  
**Creative director** Valerie Jamieson  
**Sales director** Jacqui McCarron  
**Exhibition sales manager** Charles Mostyn  
**Event manager** Henry Gormm  
**Marketing executive** Sasha Marks

**UK Newsstand**

**Tel** +44 (0)20 3787 9001  
 Newstrade distributed by Marketforce UK Ltd,  
 2nd Floor, 5 Churchill Place, Canary Wharf,  
 London E14 5HU

**Syndication**

Tribune Content Agency  
**Tel** +44 (0)20 7588 7588  
**Email** tca-articlesales@tribpub.com

**Subscriptions**

news scientist.com/subscribe  
**Tel** +44 (0)330 333 9470  
**Email** ns.subs@quadrantsubs.com  
**Post** New Scientist, Rockwood House,  
 Penrymount Road, Haywards Heath,  
 West Sussex RH16 3DH



Volume 241 No 3211

**On the cover**

- 32 Guilt-free flying**  
The tech turning aviation green
- 12 Intel v Google**  
Race to build first true quantum computer
- 16 Buried treasure**  
Your guide to Europe's biggest dig
- 26 New Year, new you**  
10 resolutions really worth making
- Plus** Square droplets (8). Lost islands of the Galapagos (15). Cannibal frogs (10). Flying robots (8). Anxious crayfish (9)



Insight Who should profit from creative AIs? 18

**Leaders**

- 5** Our love of foreign travel means aviation must go green. Living better needn't be onerous

**News**

- 6 NEWS & TECHNOLOGY** Young blood tested on Parkinson's. A skiing exoskeleton for the slopes. A visit to a distant world. Army robot flies like a bird. Liquid forms square droplets. Cold atoms put on quantum fireworks show. Crayfish show signs of anxiety. Stone Age chewing gum reveals how ancient woman lived. Cannibal frog's taste for tadpoles. Spotting risk of PTSD from a skin test. Intel's quantum computing goal. Lost islands of the Galapagos. How to get rich people to donate more. Europe's biggest archaeological dig

**Analysis**

- 18 INSIGHT** How will creative artificial intelligence change copyright?
- 20 COMMENT** Resolutions for world leaders. Surrogacy laws
- 21 ANALYSIS** Women are finally getting equal access to the Hubble telescope

**Features**

- 26 Happy new you** 10 resolutions really worth making
- 32 Green skies flying** Our aviation addiction is ruining the climate. New tech could fix it
- 39 Land of giants** Journey to the Chilean desert to discover the world's most powerful optical telescope

**Culture**

- 44 Books of 2019** From Einstein to survival strategies, a sneak peek at the best forthcoming books
- 46 Roll up to the future** Visions of tomorrow dominate the new crop of exhibitions. PLUS: This week's cultural picks

**Regulars**

- 22 APERTURE**  
Ultimate test kitchen
- 52 LETTERS**  
Last chance to save our climate?
- 55 FROM THE ARCHIVES**  
A lost generation of scientists
- 56 FEEDBACK**  
Put a spring in your step
- 57 THE LAST WORD**  
Food for thought



# CONTENTS

## New Scientist

**Management**  
**Executive chairman** Bernard Gray  
**Chief executive** Nina Wright  
**Finance director** Jenni Prince  
**Chief technology officer** Chris Corderoy  
**Marketing director** Jo Adams  
**Human resources** Shirley Spencer  
**Non-executive director** Louise Rogers

**Publishing and commercial**  
**HR co-ordinator** Serena Robinson  
**Facilities manager** Ricci Welch  
**Executive assistants** Sarah Gauld, Lorraine Lodge  
**Receptionist** Alice Catling

**Display advertising**  
**Tel** +44 (0)20 7611 1291  
**Email** displayads@newscientist.com  
**Commercial director** Chris Martin  
 Lynne Garcia, Richard Holliman, Justin Viljoen, Henry Vowden, Helen Williams

**Recruitment advertising**  
**Tel** +44 (0)20 7611 1204  
**Email** nssales@newscientist.com  
**Recruitment sales manager** Mike Black  
**Key account managers** Viren Vadgama, Isabelle Cavill, Nicola Cubeddu  
**US sales manager** Jeanne Shapiro

**Marketing**  
**Head of marketing** Lucy Dunwell  
 David Hunt, Nashitha Suren, Chloe Thompson

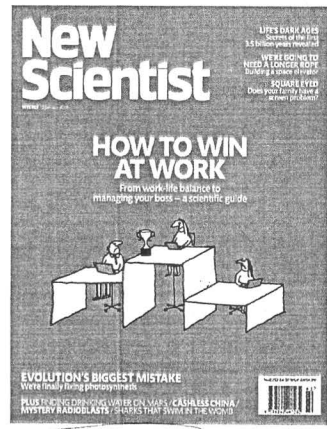
**Web development**  
 Maria Moreno Garrido, Tom McQuillan, Amardeep Sian

**New Scientist Live**  
**Tel** +44 (0)20 7611 1206  
**Email** live@newscientist.com  
**Events director** Adrian Newton  
**Creative director** Valerie Jamieson  
**Sales director** Jacqui McCarron  
**Exhibition sales manager** Charles Mostyn  
**Event manager** Henry Gomm  
**Marketing executive** Sasha Marks

**UK Newsstand**  
**Tel** +44 (0)20 3787 9001  
 Newstrade distributed by Marketforce UK Ltd, 2nd Floor, 5 Churchill Place, Canary Wharf, London E14 5HU

**Syndication**  
 Tribune Content Agency  
**Tel** +44 (0)20 7588 7588  
**Email** tca-articlesales@tribpub.com

**Subscriptions**  
**newscientist.com/subscribe**  
**Tel** +44 (0)330 333 9470  
**Email** ns.subs@quadrantsubs.com  
**Post** New Scientist, Rockwood House, Perrymount Road, Haywards Heath, West Sussex RH16 3DH



Volume 241 No 3212

### On the cover

- 28 Life's dark ages**  
Secrets of the first 3.5 billion years revealed
  - 42 We're going to need a longer rope**  
Building a space elevator
  - 24 Square eyed**  
Does your family have a screen problem?
  - 33 How to win at work**  
From work-life balance to managing your boss - a scientific guide
  - 16 Evolution's biggest mistake**  
We're finally fixing photosynthesis
- Plus** Finding drinking water on Mars (12). Cashless China (22). Mystery radioblats (9). Sharks that swim in the womb (8)



Insight China is embracing a new way to pay 22

### Leaders

- 5** We can make work work for us all. It is essential everyone understands how algorithms function

### News

- 6 THIS WEEK** Algorithm decides which crimes to investigate. Far side of the moon. Gene-editing rules. German politicians hacked
- 8 NEWS & TECHNOLOGY**  
Cuba's "hidden" Zika outbreak. Embryonic cannibal sharks. Medieval coin switch. Cosmic radio mystery. Ditching Facebook may reduce stress. Blonde monkeys. Water wells on Mars. Brain tries to block thoughts to ease grief. Face-scanning AI helps spot rare genetic disorders. Chicken faecal transplants. Hacking photosynthesis. Milky Way collision
- 19 IN BRIEF** DNA testing newborns. Light beam controls bladder. Polluting ants. Waves on icy worlds. Self-cleaning spacesuits. Truth matters in Australia

### Analysis

- 22 INSIGHT** How China is building a cashless future
- 24 COMMENT** Family screen use can be healthy. Whales may have a bright future
- 25 ANALYSIS** Falling UK electricity use isn't good news for climate

### Features

- 28 The darkest ages** For billions of years, life barely left a trace. Now its secrets are being revealed
- 33 How to win at work** A survival guide to making the most of your working life
- 42 We're going to need a longer rope** Plans for a space elevator are getting a much-needed lift

### Culture

- 44 Call AI by a better name** We're using the wrong words to talk about artificial intelligence
- 45 The liver man** The tough life of transplant pioneer Thomas Starzl  
PLUS: This week's cultural picks
- 46 Morocco's watery ways** How ingenious old tech shows its place in conserving today's water

### Regulars

- 26 APERTURE**  
World's biggest artificial sun
- 52 LETTERS**  
What are the barriers to climate action?
- 55 CROSSWORD**
- 56 FEEDBACK**  
Ecological stock cubes
- 57 THE LAST WORD**  
Around and about

78

जो 13/1/19  
 प्रलेखन प्रभाग  
 पुस्तकालय और प्रलेखन प्रभाग  
 510 सी 00 प 00 प 00  
 नई दिल्ली-16

**New Scientist**

**Management**

**Executive chairman** Bernard Gray  
**Chief executive** Nina Wright  
**Finance director** Jenni Prince  
**Chief technology officer** Chris Corderoy  
**Marketing director** Jo Adams  
**Human resources** Shirley Spencer  
**Non-executive director** Louise Rogers

**Publishing and commercial**

**HR co-ordinator** Serena Robinson  
**Facilities manager** Ricci Welch  
**Executive assistants** Sarah Gauld, Lorraine Lodge  
**Receptionist** Alice Catling

**Display advertising**

**Tel** +44 (0)20 7611 1291  
**Email** displayads@news scientist.com

**Commercial director** Chris Martin  
 Lynne Garcia, Richard Holliman, Justin Viljoen,  
 Henry Vowden, Helen Williams

**Recruitment advertising**

**Tel** +44 (0)20 7611 1204  
**Email** nssales@news scientist.com  
**Recruitment sales manager** Mike Black  
**Key account managers** Viren Vadgama, Isabelle Cavill, Nicola Cubeddu  
**US sales manager** Jeanne Shapiro

**Marketing**

**Head of marketing** Lucy Dunwell  
 David Hunt, Nashitha Suren, Chloe Thompson

**Web development**

Maria Moreno Garrido, Tom McQuillan,  
 Amardeep Sian

**New Scientist Live**

**Tel** +44 (0)20 7611 1206  
**Email** live@news scientist.com  
**Events director** Adrian Newton  
**Creative director** Valerie Jamieson  
**Sales director** Jacqui McCarron  
**Exhibition sales manager** Charles Mostyn  
**Event manager** Henry Gomm

**UK Newsstand**

**Tel** +44 (0)20 3787 9001  
 Newstrade distributed by Marketforce UK Ltd,  
 2nd Floor, 5 Churchill Place, Canary Wharf,  
 London E14 5HU

**Syndication**

Tribune Content Agency  
**Tel** +44 (0)20 7588 7588  
**Email** tca-articlesales@tribpub.com

**Subscriptions**

**news scientist.com/subscribe**  
**Tel** +44 (0)330 333 9470  
**Email** ns.subs@quadrantsubs.com  
**Post** New Scientist, Rockwood House,  
 Perymount Road, Haywards Heath,  
 West Sussex RH16 3DH



Volume 241 No 3213

**On the cover**

- 38 In search of eureka**  
Has physics run out of big ideas?
- 22 Queen of tidy**  
Unpacking the cult of Marie Kondo
- 30 The exercise paradox**  
Why you can't just burn off extra calories
- 26 Lost cities of the Amazon**  
How the world's greatest rainforest was once a thriving metropolis
- 4 China's moon garden**  
New era begins as first plants grown on lunar surface
- Plus** Roaming black hole (14). The world at 1.5 degrees (34). Ghost X-rays (13). Beating the superbugs (20). Crystal stars (17)



Comment Why do we hate tidying, but love Marie Kondo? 22

**Leader**

- 3 Rational thinking can help avert antibiotics disaster**

**News**

- 4 THIS WEEK** Health risks of no-deal Brexit. China's moon garden. Toxic desalination
- 6 NEWS & TECHNOLOGY** Astronauts face superbugs. Hackers might be stealing your computer power. Gut bacteria linked to allergies. Cuttlefish embryos sense predators. Banned toxins still threaten dolphins. Mixed-up star system. Why do drones cause so much trouble for airports? Teachers snoop on their pupils' brains. Ghost X-rays. Bacteria live in China's smog. Jupiter-sized black hole

- 16 IN BRIEF** Stars become crystals. Bees lose sleep. Ginger reduces disgust. Pre-historic whale-eating whale. Medieval female scribes

**Analysis**

- 20 INSIGHT** We are finally facing down antibiotic resistance
- 22 COMMENT** The cult of Marie Kondo. Hope for people with type 2 diabetes
- 23 ANALYSIS** We still don't know if fake news elected Donald Trump

**Features**

- 26 The people who built the Amazon** How a lost civilisation transformed the rainforest
- 30 Exercise paradox** You can't just burn off holiday gluttony
- 34 A hotter future** What the world will look like with 1.5°C of warming
- 38 In search of eureka** Finding a way out of the crisis in physics

**Culture**

- 42 Cashing in on brains** A podcast lays bare a business model targeting the poorest. PLUS: This week's cultural picks
- 44 Beyond words** Artists invited to CERN capture concepts that can defy description

**Regulars**

- 24 APERTURE** Miniature Dumbo
- 52 LETTERS** Installing heat pumps
- 55 FROM THE ARCHIVES** The history of MDMA
- 56 FEEDBACK** Insect secret agents
- 57 THE LAST WORD** Wing commander

# CONTENTS

## New Scientist

### Management

**Executive chairman** Bernard Gray  
**Chief executive** Nina Wright  
**Finance director** Jenni Prince  
**Chief technology officer** Chris Corderoy  
**Marketing director** Jo Adams  
**Human resources** Shirley Spencer  
**Non-executive director** Louise Rogers

### Publishing and commercial

**HR co-ordinator** Serena Robinson  
**Facilities manager** Ricci Welch  
**Executive assistants** Sarah Gauld, Lorraine Lodge  
**Receptionist** Alice Catling

### Display advertising

**Tel** +44 (0)20 7611 1291  
**Email** displayads@newscientist.com

**Commercial director** Chris Martin  
 Lynne Garcia, Richard Holliman, Justin Viljoen, Henry Vowden, Helen Williams

### Recruitment advertising

**Tel** +44 (0)20 7611 1204  
**Email** nssales@newscientist.com  
**Recruitment sales manager** Mike Black  
**Key account managers** Viren Vadgama, Isabelle Cavill, Nicola Cubeddu  
**US sales manager** Jeanne Shapiro

### Marketing

**Head of marketing** Lucy Dunwell  
 David Hunt, Nashitha Suren, Chloe Thompson  
**Head of Data Analytics** Tom Tiner  
**Digital Marketing Manager** Poppy Lepora

### Web development

Maria Moreno Garrido, Tom McQuillan, Amardeep Sian

### New Scientist Live

**Tel** +44 (0)20 7611 1206  
**Email** live@newscientist.com  
**Events director** Adrian Newton  
**Creative director** Valerie Jamieson  
**Sales director** Jacqui McCarron  
**Exhibition sales manager** Charles Mostyn  
**Event manager** Henry Gomm

### UK Newsstand

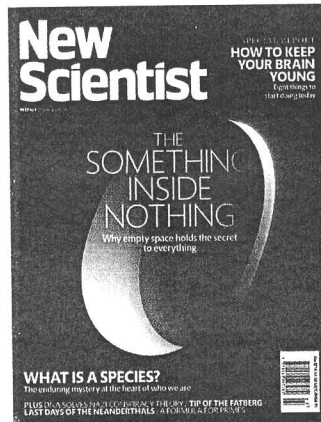
**Tel** +44 (0)20 3787 9001  
 Newstrade distributed by Marketforce UK Ltd,  
 2nd Floor, 5 Churchill Place, Canary Wharf,  
 London E14 5HU

### Syndication

Tribune Content Agency  
**Tel** +44 (0)20 7588 7588  
**Email** tca-articlesales@tribpub.com

### Subscriptions

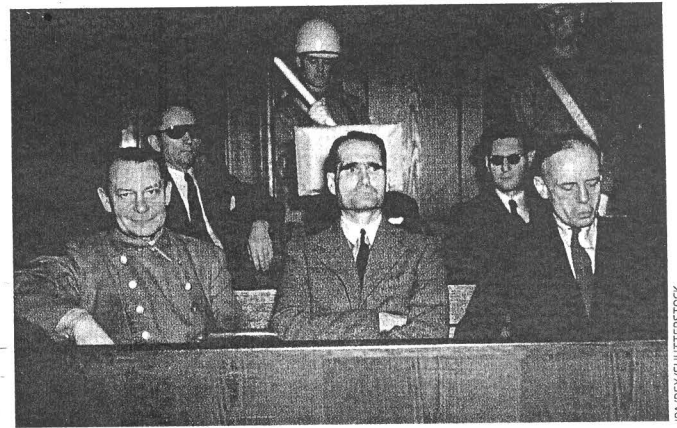
**newscientist.com/subscribe**  
**Tel** +44 (0)330 333 9470  
**Email** ns.subs@quadrantsubs.com  
**Post** New Scientist, Rockwood House,  
 Perymount Road, Haywards Heath,  
 West Sussex RH16 3DH



Volume 241 No 3214

## On the cover

- 30 How to keep your brain young** Eight things to start doing today
- 40 The something inside nothing** Why empty space holds the secret to everything
- 36 What is a species?** The enduring mystery at the heart of who we are
- Plus** DNA solves Nazi conspiracy theory (9). Tip of the fatberg (22). Last days of the Neanderthals (10). A formula for primes (10)



News DNA settles Rudolf Hess conspiracy theory 9

## Leaders

The complex moral impacts of our choices. Should we ditch the idea of "species"?

## News

- 6 THIS WEEK** Earliest animal ever found. CRISPR baby investigation. Meteorite hits moon during eclipse
- 8 NEWS & TECHNOLOGY** Ordinary camera made to see around corners. World leaders worry about climate chaos. DNA solves Nazi conspiracy theory. Neanderthal's last stand. Formula for prime numbers. Robot dog learns to run. Fish could help us live in space. AI copies drugs cheaply. Moon impacts reveal Earth's history. Prosecco may be eroding Italian hills. Beatles-style songs made by machines

- 19 IN BRIEF** Saturn's young rings. Feeling injuries without pain. Why hermit crabs have long penises. New type of blood vessel found

## Analysis

- 22 INSIGHT** Everything you want to know about fatbergs but are too disgusted to ask
- 24 COMMENT** Why it's not worth spending billions to upgrade the LHC. Share seeds, feed the world
- 25 ANALYSIS** Can a diet save the planet?

## Features

- 30 How to nurture your mind** Eight things to start doing today
- 36 Is this the end of species?** The enduring mystery at the heart of who we are
- 40 Something from nothing** We are about to find out what empty space is made of

## Culture

- 44 A virtual voyage begins** What discoveries await an epic player mission to the Milky Way's edge?
- 45 Unveiling the obvious** Images of the digital world reveal little. PLUS: The week's cultural picks
- 46 World of pain** The unsung story of slave women makes a play that merits a wide audience

## Regulars

- 28 APERTURE** Icy discworld
- 52 LETTERS** Genetic testing lessons
- 55 CROSSWORD**
- 56 FEEDBACK** Mona Lisa's gaze
- 57 THE LAST WORD** A key question

# CONTENTS

## New Scientist

### Management

**Executive chairman** Bernard Gray  
**Chief executive** Nina Wright  
**Finance director** Jenni Prince  
**Chief technology officer** Chris Corderoy  
**Marketing director** Jo Adams  
**Human resources** Shirley Spencer  
**Non-executive director** Louise Rogers

### Publishing and commercial

**HR co-ordinator** Serena Robinson  
**Facilities manager** Ricci Welch  
**Executive assistants** Sarah Gauld, Lorraine Lodge  
**Receptionist** Alice Catling

### Display advertising

**Tel** +44 (0)20 7611 1291  
**Email** displaysads@newscientist.com

**Commercial director** Chris Martin  
 Lynne Garcia, Richard Holliman, Justin Viljoen, Henry Vowden, Helen Williams

### Recruitment advertising

**Tel** +44 (0)20 7611 1204  
**Email** nssales@newscientist.com  
**Recruitment sales manager** Mike Black  
**Key account managers** Viren Vadgama, Isabelle Cavill, Nicola Cubeddu  
**US sales manager** Jeanne Shapiro

### Marketing

**Head of marketing** Lucy Dunwell  
 David Hunt, Nashitha Suren, Chloe Thompson  
**Head of Data Analytics** Tom Tiner  
**Digital Marketing Manager** Poppy Lepora

### Web development

María Moreno Garrido, Tom McQuillan, Amardeep Sian

### New Scientist Live

**Tel** +44 (0)20 7611 1206  
**Email** live@newscientist.com  
**Events director** Adrian Newton  
**Creative director** Valerie Jamieson  
**Sales director** Jacqui McCarron  
**Exhibition sales manager** Charles Mostyn  
**Event manager** Henry Gomm

### UK Newsstand

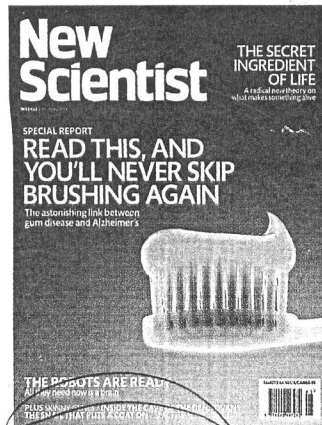
**Tel** +44 (0)20 3787 9001  
 Newstrade distributed by Marketforce UK Ltd, 2nd Floor, 5 Churchill Place, Canary Wharf, London E14 5HU

### Syndication

Tribune Content Agency  
**Tel** +44 (0)20 7588 7588  
**Email** tca-articlesales@tribpub.com

### Subscriptions

**newscientist.com/subscribe**  
**Tel** +44 (0)330 333 9470  
**Email** ns.subs@quadrantsubs.com  
**Post** New Scientist, Rockwood House, Perrymount Road, Haywards Heath, West Sussex RH16 3DH



Volume 241 No 3215

### On the cover

#### 28 The secret ingredient of life

A radical new theory on what makes something alive

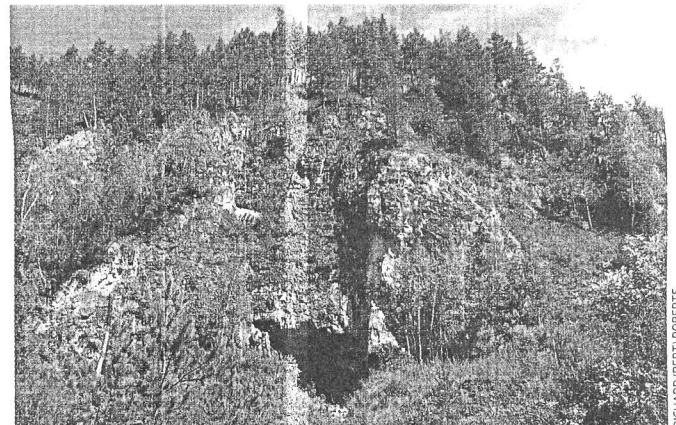
#### 6 Read this, and you'll never skip brushing again

The astonishing link between gum disease and Alzheimer's

#### 34 The robots are ready

All they need now is a brain

**Plus** Skinny genes (20). Inside the cave of the Denisovans (12). The snail that puts a coat on (10). Space-time Morse code (10)



News & Technology Inside archaeology's most exciting cave 12

### Leaders

5 The role of bacteria in our health looks more significant than ever. Life's greatest puzzles

### News

6 **SPECIAL REPORT** Does gum disease cause Alzheimer's? A landmark study could explain why we still don't have good treatments for the most common type of dementia

10 **NEWS & TECHNOLOGY** Virtual particles can send a message. Some snails have coats made of algae. Inside Denisova cave. DeepMind's AI vanquishes human pro video game players. AI goes quantum. How to incubate IVF embryos in wombs instead of labs. Autonomous cars are learning from bad drivers

19 **IN BRIEF** Rocking at night is good for sleep. Tumour-killing virus could stop a childhood eye cancer. Skinny genes. Moon's birth helped Earth life. Megawave made in lab

### Analysis

22 **INSIGHT** Seeking sperm donors online might not be worth the risks

24 **COMMENT** Should we rename some cancers? How to eat eco-consciously all year round

25 **ANALYSIS** Books can't reveal US societal norms

### Features

28 **Life's secret ingredient** The crucial element we need to understand living things

34 **The robots are ready** Are we living in a machine age? Time to separate the truth from the hype

40 **Arctic treasure map** Climate change is revealing valuable resources at the top of the globe

### Culture

44 **Dodge the question** Forget the disputes about the nature of time and instead enjoy this dreamlike show. PLUS: the week's cultural picks

46 **Great reads** Catch up with a rich story of the sun's influence on life

### Regulars

26 **APERTURE** Float like a butterfly

52 **LETTERS** Let's do the time walk again

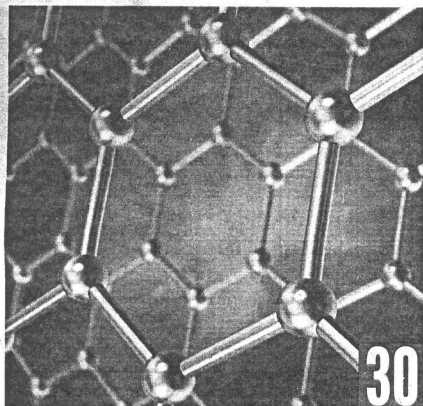
55 **FROM THE ARCHIVES** The science of dowsing

56 **FEEDBACK** Kingdoms built on plastic

57 **THE LAST WORD** Clearing the air

# PHYSICS TODAY

January 2019 | volume 72 number 1



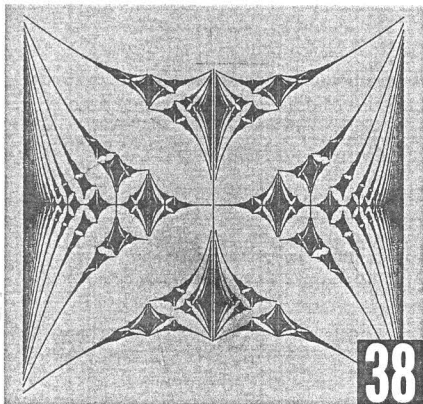
30

## FEATURES

### 30 When condensed-matter physics became king

Joseph D. Martin

The story of how solid-state physics emerged in the postwar period and was eventually rebranded as condensed-matter physics illuminates some major shifts in the late-20th-century physics community.



38

### 38 Artificial gauge fields with ultracold atoms

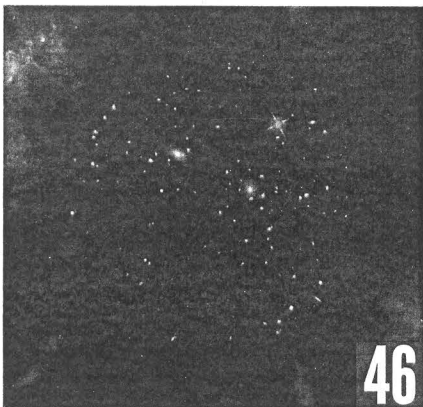
Victor Galitski, Gediminas Juzeliūnas, and Ian B. Spielman

Suitable combinations of laser beams can make neutral atoms behave like electrons in a magnetic field.

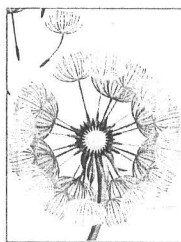
### 46 The stormy life of galaxy clusters

Lawrence Rudnick

Tempestuous interactions between plasmas, galaxies, and dark matter have shaped the history and current structure of the universe.



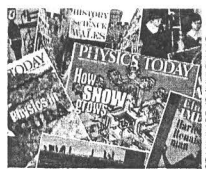
46



**ON THE COVER:** After dandelions flower, their heads close and reopen to reveal spherical white puffs of seeds. As illustrated here, each seed is topped by a bunch of filaments known as a plume or pappus. A new study shows that falling dandelion pappi produce a special type of vortex that retards their descent and extends the range of their wind-based travel. To learn more about how dandelion seeds fly, see the story on **page 17**. (Image by iStock.com/Godruma.)

Recently on  
**PHYSICS  
TODAY  
ONLINE**

[www.physicstoday.org](http://www.physicstoday.org)



D. BOJANIC CLIMBINGS

#### ► Best of 2018

Take a look back at PHYSICS TODAY's most popular stories from last year, including several that can be found only online. Among the selections are a little-known anecdote about Albert Einstein and a story of a bitter feud between two top physical chemists that boiled down to a coding bug.

[physicstoday.org/Jan2019a](http://physicstoday.org/Jan2019a)



JAMES MARTIN

#### ► On target

When James Martin isn't studying many-body interactions, he's shooting handcrafted arrows hundreds of meters. The physicist is a world-champion archer who has mastered flight shooting through skill, strength, and physics modeling. He describes his keys to success in a PHYSICS TODAY Q&A.

[physicstoday.org/Jan2019b](http://physicstoday.org/Jan2019b)



GEOFFREY NOTHMAN, CC BY-SA 2.5

#### ► Relic references

Starting in May the SI kilogram will no longer be defined by a metal block. But some scientists continue to rely on artifacts as standards. PHYSICS TODAY's Alex Lopatka describes the water and old rocks, some of which are no longer available, that serve as reference materials for stable-isotope geochemists.

[physicstoday.org/Jan2019c](http://physicstoday.org/Jan2019c)

**PHYSICS TODAY** (ISSN 0031-9228, coden PHTOAD) volume 72, number 1. Published monthly by the American Institute of Physics, 1305 Walt Whitman Rd, Suite 300, Melville, NY 11747-4300. Periodicals postage paid at Huntington Station, NY, and at additional mailing offices. POSTMASTER: Send address changes to PHYSICS TODAY, American Institute of Physics, 1305 Walt Whitman Rd, Suite 300, Melville, NY 11747-4300. Views expressed in PHYSICS TODAY and on its website are those of the authors and not necessarily those of AIP or any of its member societies.



**Copyright © 2019, American Institute of Physics.** Single copies of individual articles may be made for private use or research. Authorization is given to copy articles beyond the free use permitted under US Copyright Law, provided that the copying fee of \$30.00 per copy per article is paid to the Copyright Clearance Center, 222 Rosewood Dr, Danvers, MA 01923. For articles published before 1978, the copying fee is \$0.25 per article. Authorization does not extend to systematic or multiple reproduction or to republication in any form. In all such cases, specific written permission from AIP must be obtained. Send requests for permission to AIP Office of Rights and Permissions, 1305 Walt Whitman Rd, Suite 300, Melville, NY 11747-4300; phone +1 516-576-2268; email [rights@aip.org](mailto:rights@aip.org).

# PHYSICS TODAY

www.physicstoday.org



## DEPARTMENTS

8 From the editor

10 Readers' forum

Commentary: Thinking about becoming a VPR? — Mark A. Barteau • Letters

14 Search & discovery

Quantum corral herds surface electrons into a fractal lattice  
• Dandelion seeds are optimized for wind-based travel • An ancient merger helped form our galaxy

22 Issues & events

Iranian scientists persevere under renewed sanctions  
• National labs push to get technologies out the door

53 Books

Can the scientist play a role in the laws of physics? — N. David Mermin • The legacy of Cold War science propaganda — Chanda Prescod-Weinstein • The forking paths of semiclassical physics — John McGreevy • New books & media

59 New products

Focus on photonics, spectrometry, and spectroscopy

62 Obituaries

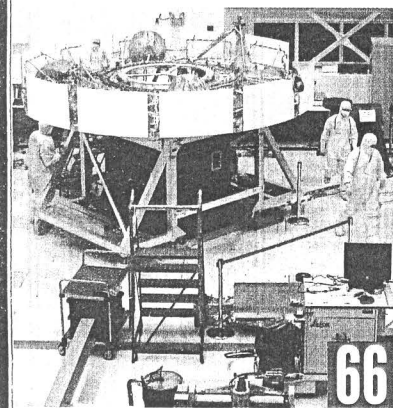
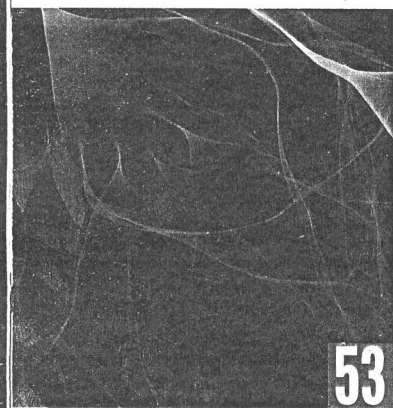
Leon Max Lederman • David Pines

66 Quick study

Protecting planets beyond Earth — Rakesh Mogul

68 Back scatter

Bipolar climate couplings



The American Institute of Physics is a federation of scientific societies in the physical sciences, representing scientists, engineers, educators, and students. AIP offers authoritative information, services, and expertise in physics education and student programs, science communication, government relations, career services, statistical research in physics employment and education, industrial outreach, and history of the physical sciences. AIP publishes PHYSICS TODAY and is also home to the Society of Physics Students and to the Niels Bohr Library and Archives. AIP owns AIP Publishing, a scholarly publisher in the physical and related sciences.

**Board of Directors:** David J. Helfand (Interim Chair), Michael H. Moloney (CEO), Judy R. Dubno (Interim Corporate Secretary), J. Daniel Bourland, Beth Cunningham, John Kent (Treasurer), Kate Kirby, Rudolf Ludeke, Allison Macfarlane, Michael Morgan, Faith Morrison, Elizabeth Nolan, Nathan Sanders, Cheryl R. Stevens.

**Officers:** Michael H. Moloney (CEO), Gigi Swartz (CFO).

**SUBSCRIPTION QUESTIONS?** +1 800-344-6902 | +1 516-576-2270 | [ptsubs@aip.org](mailto:ptsubs@aip.org)

### Senior director of news & magazines

Larry Fishbein [lfishbein@aip.org](mailto:lfishbein@aip.org)

### Editor-in-chief

Charles Day [cday@aip.org](mailto:cday@aip.org)

### Managing editor

Richard J. Fitzgerald [rjf@aip.org](mailto:rjf@aip.org)

### Art and production

Donna Padian, art director

Cynthia B. Cummings, photographer

Nathan Cromer

### Editors

Melinda Baldwin [mbaldwin@aip.org](mailto:mbaldwin@aip.org)

Steven K. Blau [skb@aip.org](mailto:skb@aip.org)

Toni Feder [tf@aip.org](mailto:tf@aip.org)

Martha M. Hanna [mmh@aip.org](mailto:mmh@aip.org)

David Kramer [dk@aip.org](mailto:dk@aip.org)

Alex Lopatka [alopatka@aip.org](mailto:alopatka@aip.org)

Christine Middleton [cmiddleton@aip.org](mailto:cmiddleton@aip.org)

Johanna L. Miller [jlml@aip.org](mailto:jlml@aip.org)

Gayle G. Parraway [ggp@aip.org](mailto:ggp@aip.org)

R. Mark Wilson [rmw@aip.org](mailto:rmw@aip.org)

### Online

Paul K. Guinnessy, director [pkg@aip.org](mailto:pkg@aip.org)

Andrew Grant, editor [agrant@aip.org](mailto:agrant@aip.org)

Angela Dombroski [atd@aip.org](mailto:atd@aip.org)

Greg Stasiewicz [gls@aip.org](mailto:gls@aip.org)

### Assistant editor

Cynthia B. Cummings

### Editorial assistant

Tonya Gary

### Contributing editor

Andreas Mandelis

### Sales and marketing

Christina Unger Ramos [cunger@aip.org](mailto:cunger@aip.org)

Unique Carter

Krystal Dell

Skye Haynes

### Address

American Center for Physics

One Physics Ellipse

College Park, MD 20740-3842

+1 301-209-3100

[pteditors@aip.org](mailto:pteditors@aip.org)

 [PhysicsToday](https://www.facebook.com/PhysicsToday)  [@physicstoday](https://twitter.com/physicstoday)

## AIP | American Institute of Physics

### Member societies

Acoustical Society of America

American Association of Physicists in Medicine

American Association of Physics Teachers

American Astronomical Society

American Crystallographic Association

American Meteorological Society

American Physical Society

AVS: Science & Technology of Materials, Interfaces, and Processing

The Optical Society

The Society of Rheology

### Other member organizations

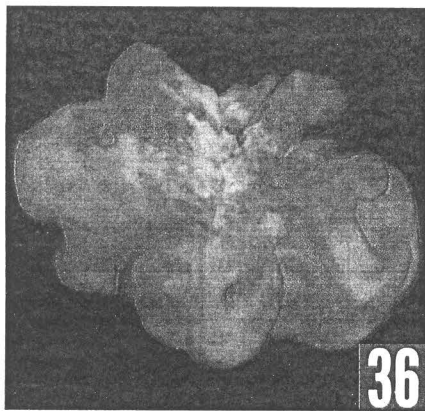
Sigma Pi Sigma Physics Honor Society

Society of Physics Students

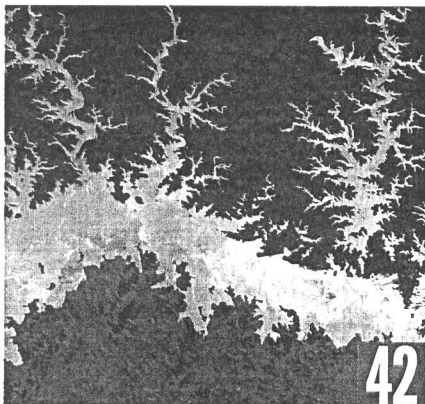
Corporate Associates

# PHYSICS TODAY

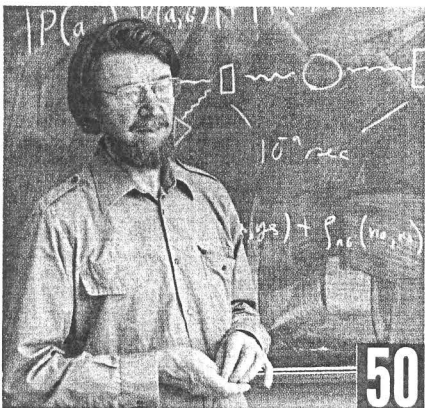
February 2019 | volume 72 number 2



36



42



50

## FEATURES

### Reviews of Modern Physics at 10

- 32 Introduction**  
Randall D. Kamien
- 34 The history of *Reviews of Modern Physics***  
Anthony F. Starace
- 36 The origin of the elements**  
Stanford E. Woosley, Virginia Trimble, and Friedrich-Karl Thielemann
- 38 From simple liquids to colloids and soft matter**  
Robert Evans, Daan Frenkel, and Marjolein Dijkstra
- 40 Beams and plasmas**  
Wim Leemans
- 42 Theory of dynamic critical phenomena**  
Bertrand I. Halperin
- 44 Progress in superconductivity**  
Arthur Hebard and Gregory Stewart
- 46 Tying it all together**  
Paul M. Goldbart and Randall D. Kamien
- 48 Coherent light brightens the quantum science frontier**  
Margaret M. Murnane and Jun Ye
- 50 Quantum foundations**  
David P. DiVincenzo and Christopher A. Fuchs
- 52 Constructing the theory of the standard model**  
Mary K. Gaillard and Paul Langacker
- 54 Experimental basis of the standard model**  
Paul Grannis and Vera Lüth



**ON THE COVER:** In 1928 John Tate wrote to 48 of his fellow physicists to ask whether the American Physical Society should establish a review journal. The positive response he received sparked the launch a year later of *Reviews of Modern Physics*. Starting on page 32 you'll find a series of short articles produced in celebration of the influential journal's 90th birthday. The cover illustration, a detail from *Composition 1923* by American cubist Patrick Henry Bruce (1881–1936), also comes from the 1920s, which saw great changes not just in physics but also in art, literature, and music. (Peter Horree/Alamy stock photo.)

### Recently on PHYSICS TODAY ONLINE

[www.physicstoday.org](http://www.physicstoday.org)



NATIONAL SCIENCE BOARD

#### US science advisers

Last month the Senate confirmed Kelvin Droegemeier as director of the White House Office of Science and Technology Policy and presidential science adviser. David Kramer looks back at some of Droegemeier's predecessors, who experienced varying amounts of success in the challenging position.

[physicstoday.org/Feb2019a](http://physicstoday.org/Feb2019a)



SKA SOUTH AFRICA

#### Powering SKA

When completed, the Square Kilometre Array (SKA) will be the world's largest telescope configuration. The problem: how to power the project's radio dishes and antennas, many of which will be spaced far apart in remote areas. Sarah Wild explores SKA scientists' high-stakes energy strategy and how it has changed in recent years.

[physicstoday.org/Feb2019b](http://physicstoday.org/Feb2019b)



ROYAL OBSERVATORY, EDINBURGH

#### Bell Burnell Q&A

In 2018, a half century after her first publication on radio pulsars, Jocelyn Bell Burnell was awarded the \$3 million Special Breakthrough Prize in Fundamental Physics. In an extensive interview, Bell Burnell discusses her discovery, her Nobel snub, and her decision to donate all of the prize money.

[physicstoday.org/Feb2019c](http://physicstoday.org/Feb2019c)

**PHYSICS TODAY** (ISSN 0031-9228, coden PHTOAD) volume 72, number 2. Published monthly by the American Institute of Physics, 1305 Walt Whitman Rd, Suite 300, Melville, NY 11747-4300. Periodicals postage paid at Huntington Station, NY, and at additional mailing offices. POSTMASTER: Send address changes to PHYSICS TODAY, American Institute of Physics, 1305 Walt Whitman Rd, Suite 300, Melville, NY 11747-4300. Views expressed in PHYSICS TODAY and on its website are those of the authors and not necessarily those of AIP or any of its member societies.



Copyright © 2019, American Institute of Physics. Single copies of individual articles may be made for private use or research. Authorization is given to copy articles beyond the free use permitted under US Copyright Law, provided that the copying fee of \$30.00 per copy per article is paid to the Copyright Clearance Center, 222 Rosewood Dr, Danvers, MA 01923. For articles published before 1978, the copying fee is \$0.25 per article. Authorization does not extend to systematic or multiple reproduction or to republication in any form. In all such cases, specific written permission from AIP must be obtained. Send requests for permission to AIP Office of Rights and Permissions, 1305 Walt Whitman Rd, Suite 300, Melville, NY 11747-4300; phone +1 516 576-2268; email [rights@aip.org](mailto:rights@aip.org).

# PHYSICS TODAY

www.physicstoday.org

## DEPARTMENTS

### 8 From the editor

### 10 Readers' forum

Commentary: Multimessenger solar astrophysics

— *Hugh Hudson and Leif Svalgaard* • Letters

### 14 Search & discovery

An unexpected spin flip alters the course of a chemical reaction • Machine learning improves image restoration  
• Satellites glimpse the microphysics of magnetic reconnection

### 24 Issues & events

Ireland's scientists seek a shift in support toward basic research • Side trips on the road to fusion

### 57 Books

Letters from a remarkable life in science — *Phillip F. Schewe* • The not-so-secret science ecosystem — *Robert P. Crease* • Is the future as real as the present? — *Anthony Aguirre* • New books & media

### 65 New products

Focus on analytical equipment, sensors, and instrumentation.

### 71 Obituaries

Riccardo Giacconi

### 74 Quick study

The power and pitfalls of focus groups — *Laura Merner and Anne Marie Porter*

### 76 Back scatter

A Martian ice mound

### Senior director of news & magazines

Larry Fishbein [lfishbein@aip.org](mailto:lfishbein@aip.org)

### Editor-in-chief

Charles Day [cday@aip.org](mailto:cday@aip.org)

### Managing editor

Richard J. Fitzgerald [rjf@aip.org](mailto:rjf@aip.org)

### Art and production

Donna Padian, art director

Freddie A. Pagani, art and production associate

Cynthia B. Cummings, photographer

Nathan Cromer

### Editors

Melinda Baldwin [mbaldwin@aip.org](mailto:mbaldwin@aip.org)

Steven K. Blau [skb@aip.org](mailto:skb@aip.org)

Toni Feder [tf@aip.org](mailto:tf@aip.org)

Martha M. Hanna [mmh@aip.org](mailto:mmh@aip.org)

Heather M. Hill [hhill@aip.org](mailto:hhill@aip.org)

David Kramer [dk@aip.org](mailto:dk@aip.org)

Alex Lopatka [alopatka@aip.org](mailto:alopatka@aip.org)

Christine Middleton [cmiddleton@aip.org](mailto:cmiddleton@aip.org)

Johanna L. Miller [jlm@aip.org](mailto:jlm@aip.org)

Gayle G. Parraway [ggp@aip.org](mailto:ggp@aip.org)

R. Mark Wilson [rmw@aip.org](mailto:rmw@aip.org)

### Online

Paul K. Guinnessy, director [pkg@aip.org](mailto:pkg@aip.org)

Andrew Grant, editor [agrant@aip.org](mailto:agrant@aip.org)

Angela Dombroski [atd@aip.org](mailto:atd@aip.org)

Greg Stasiewicz [gls@aip.org](mailto:gls@aip.org)

### Assistant editor

Cynthia B. Cummings

### Editorial assistant

Tonya Gary

### Contributing editors

Rachel Berkowitz

Andreas Mandelis

### Sales and marketing

Christina Unger Ramos [cunger@aip.org](mailto:cunger@aip.org)

Unique Carter

Krystal Dell

### Address

American Center for Physics

One Physics Ellipse

College Park, MD 20740-3842

+1 301 209-3100

[pteditors@aip.org](mailto:pteditors@aip.org)

 [PhysicsToday](https://www.facebook.com/PhysicsToday)  [@physicstoday](https://twitter.com/physicstoday)

## AIP | American Institute of Physics

### Member societies

Acoustical Society of America

American Association of Physicists in Medicine

American Association of Physics Teachers

American Astronomical Society

American Crystallographic Association

American Meteorological Society

American Physical Society

AVS: Science & Technology of Materials, Interfaces, and Processing

The Optical Society

The Society of Rheology

### Other member organizations

Sigma Pi Sigma Physics Honor Society

Society of Physics Students

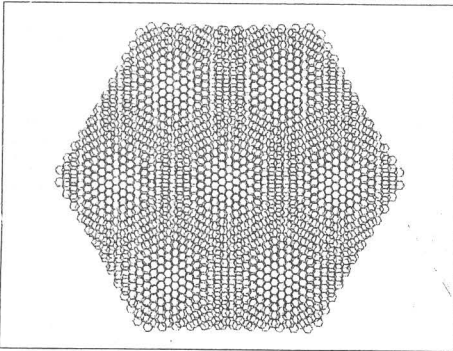
Corporate Associates

The American Institute of Physics is a federation of scientific societies in the physical sciences, representing scientists, engineers, educators, and students. AIP offers authoritative information, services, and expertise in physics education and student programs, science communication, government relations, career services, statistical research in physics employment and education, industrial outreach, and history of the physical sciences. AIP publishes PHYSICS TODAY and is also home to the Society of Physics Students and to the Niels Bohr Library and Archives. AIP owns AIP Publishing, a scholarly publisher in the physical and related sciences.

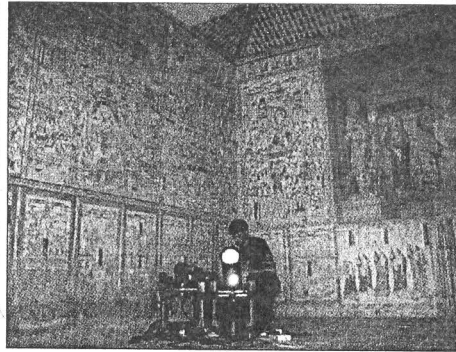
**Board of Directors:** David J. Helfand (Interim Chair), Michael H. Moloney (CEO), Judy R. Dubno (Interim Corporate Secretary), J. Daniel Bourland, Beth Cunningham, John Kent (Treasurer), Kate Kirby, Rudolf Ludeke, Allison Macfarlane, Michael Morgan, Faith Morrison, Elizabeth Nolan, Nathan Sanders, Cheryl R. Stevens.

**Officers:** Michael H. Moloney (CEO), Gigi Swartz (CFO).

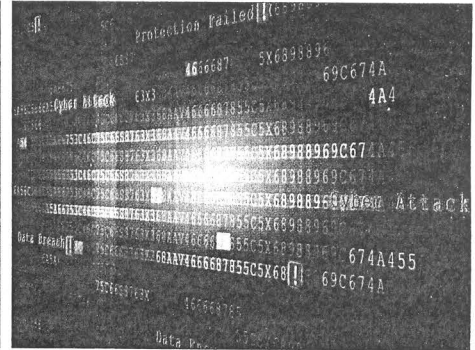
SUBSCRIPTION QUESTIONS? +1 800 344-6902 | +1 516 576-2270 | [ptsubs@aip.org](mailto:ptsubs@aip.org)



**Graphene does the twist**  
The Physics World Breakthrough of the Year 2018 6–7



**Peering deep**  
Hyperspectral imaging looks underneath art 25–28



**Tipping point**  
The quantum equivalent of the Y2K moment 40–43

<b>Quanta</b>	<b>3</b>
<b>Frontiers</b>	<b>4</b>
Further black-hole mergers seen • Physicists make magnetic field diode • New contact lens has chips and antenna • Wombat poo mystery solved	
<b>News &amp; Analysis</b>	<b>6</b>
Graphene twist bags Breakthrough of the Year award • NASA's InSight mission lands on Mars • US faces economic climate-change threat • Call for environmental engineering education revamp • Astrophysicist faces sexual misconduct allegations • Quantum computer remains a decade away, says panel • Quantum pioneer: Siddarth Koduru Joshi	
<b>Comment</b>	<b>13</b>
Quantum horizons	
<b>Forum</b>	<b>15</b>
The spirit of science <i>Liujun Zou</i>	
<b>Transactions</b>	<b>17</b>
It's a quantum world <i>James McKenzie</i>	
<b>Critical Point</b>	<b>19</b>
Revolting physics <i>Robert P Crease</i>	
<b>Feedback</b>	<b>21</b>
SI unit redefinitions, varying constants, nuclear gaps, apostrophes and attoseconds	

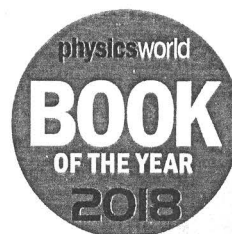
## Features

<b>Hidden pictures</b>	<b>25</b>
The technique of hyperspectral imaging is helping to uncover paintings hidden beneath artworks, notably Picasso's <i>Mother and Child by the Sea</i> , as <i>Stephen Ornes</i> explains	
<b>Pull your knit</b>	<b>30</b>
Most physicists don't start their PhDs by watching YouTube videos. But that's what <i>Samuel Poincloux</i> did to begin investigating the physics of knitted fabrics	
<b>The future is flexible</b>	<b>35</b>
Thin 2D semiconductors could lead to a new generation of flexible, wearable electronic devices – ideal for military and outdoor applications, as <i>Nicola Townsend</i> and <i>Iddo Amit</i> explain	
<b>The quantum Y2K moment</b>	<b>40</b>
Quantum computers threaten many of the encryption systems that keep online communications secure. <i>Margaret Harris</i> investigates plans to make the Internet “quantum-safe”	
<b>Reviews</b>	<b>45</b>
Hellions of the solar system <i>David Appell</i> • An anxious descent <i>Chanda Prescod-Weinstein</i> • <i>Physics World</i> Book of the Year 2018	
<b>Careers</b>	<b>50</b>
Levelling the physics field <i>Jennifer Dyer</i>	
<b>Recruitment</b>	<b>52</b>
<b>Lateral Thoughts</b>	<b>56</b>
Recipe for a miracle <i>Sebastian Wood</i>	

**On the cover**  
The mechanics of knitted fabrics 30–33 (*iStock/Elena Feodrina*)  
Putting 2D semiconductors to practical use 35–38  
Hyperspectral imaging reveals Picasso's secrets 25–28  
Making the Internet safe in the quantum era 40–43

*Physics World* is published monthly as 12 issues per annual volume by IOP Publishing Ltd, Temple Circus, Temple Way, Bristol BS1 6HG, UK

**United States Postal Identification Statement**  
*Physics World* (ISSN 0953-8585) is published monthly by IOP Publishing Ltd and distributed in the USA by UKP Worldwide, 3390 Rand Road, South Plainfield, NJ 07080. Periodicals postage paid at Rahway, NJ and at additional mailing offices. US Postmaster: send address changes to *Physics World*, IOP Publishing, C/O 3390 Rand Road, South Plainfield, NJ 07080.

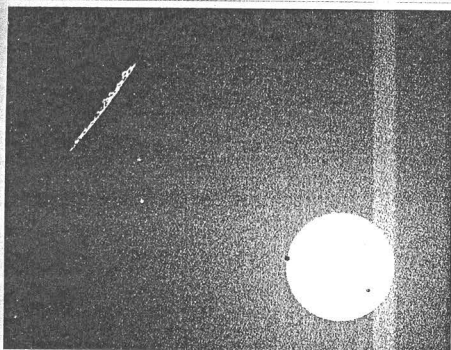


## Multimedia

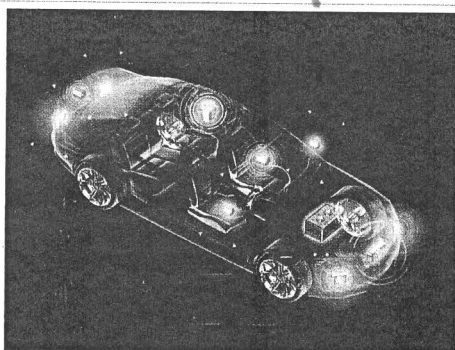
Listen to more about the winners of the *Physics World* 2018 Breakthrough of the Year and Book of the Year in our podcasts.

86

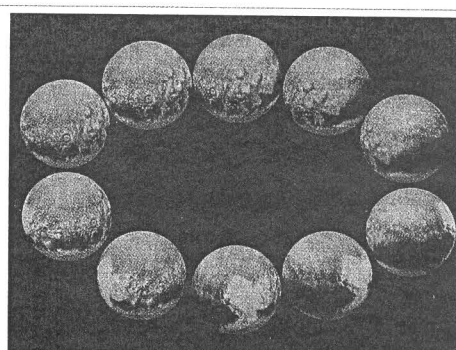
# physicsworld



**Strange visitor**  
The mysteries of 'Oumuamua 32–37



**Material benefit**  
What if a car's structure also powered it? 39–41



**Path to Pluto**  
New book details the New Horizons mission 43–44

**Quanta** 3

**Frontiers** 4

Physicists theorize antimatter universe • First commercial ion-based quantum computer • How geckos walk on water

**News & Analysis** 6

Physicists await linear-collider decision • US science hit by government shutdown • New Horizons reaches Ultima Thule • CERN releases plans for 100 km collider • China probe lands on the Moon's far side • Gran Sasso experiments forced to shut over leaks • Minority-serving institutions need more support • Call made for US fusion pilot plant • Riccardo Giacconi: 1931–2019 • Roy Glauber dies at 93

**Comment** 17

Chemical anniversary

**Forum** 19

Modernizing classical physics *David Nolte*

**Transactions** 20

Innovation, innovation *James McKenzie*

**Feedback** 23

The Breakthrough Starshot initiative, miraculous science and the winners of our 2018 Christmas jumpers competition

## Features

**An unelementary affair** 27

To mark the 150th anniversary of the periodic table, *Robert P Crease* explores why Dmitri Mendeleev's design has stood the test of time

**Visitor from another star** 32

'Oumuamua is the first confirmed interstellar object detected in our solar system – and it is baffling scientists. *Andrew Glester* investigates

**Structural supercapacitors** 39

*Natasha Shirshova* explains how electric cars could benefit from energy-storage devices that perform multiple functions

**Reviews** 43

Pathway to Pluto *Louisa Preston* • With stars in my eyes *Tushna Commissariat* • Quantum tea and toast *Tushna Commissariat*

**Careers** 48

Taking photonics into the future *Hugo Thienpoint* • Once a physicist: *Will Foxall*

**Recruitment** 51

**Lateral Thoughts** 56

The physics of a youth hostel *Richard Hollins*

### On the cover

Marking 150 years of the periodic table 27–31

(iStock/peepo)

The mystery of interstellar object 'Oumuamua 32–37

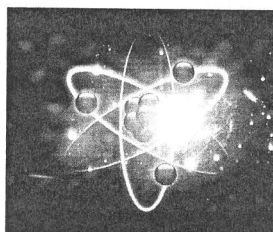
Materials that structure cars and power them too 39–41

Japan and CERN mull rival accelerator plans 6,8–9

*Physics World* is published monthly as 12 issues per annual volume by IOP Publishing Ltd, Temple Circus, Temple Way, Bristol BS1 6HG, UK

### United States Postal Identification Statement

*Physics World* (ISSN 0953-8585) is published monthly by IOP Publishing Ltd and distributed in the USA by UKP Worldwide, 3390 Rand Road, South Plainfield, NJ 07080. Periodicals postage paid at Rahway, NJ and at additional mailing offices. US Postmaster: send address changes to *Physics World*, IOP Publishing, C/O 3390 Rand Road, South Plainfield, NJ 07080.



## Multimedia

Find out more about the future of fusion energy in the latest podcast marking the 30th anniversary of *Physics World*

# Contents

## Articles

Mathematics Interventions for Upper Elementary and Secondary Students: A Meta-Analysis of Research <i>Elizabeth A. Stevens, Melissa A. Rodgers, and Sarah R. Powell</i>	327
The Application of Empirically Supported Practices in Middle School Social Studies Classrooms <i>Shawn C. Kent, Jeanne Wanzek, and Leticia Martinez</i>	341
Multisector Involvement Among Adolescents With Disabilities <i>Amanda L. Sullivan, Andrew J. Thayer, and Shanna S. Sadeh</i>	353
Teacher Educators' Perspectives: Preparing Preservice Teachers to Provide Access to the General Curriculum <i>Amy J. Olson, and Carly A. Roberts</i>	365
Examining SAEBRS Technical Adequacy and the Moderating Influence of Criterion Type on Cut Score Performance <i>Stephen P. Kilgus, Nathaniel P. von der Embse, Amanda N. Allen, Crystal N. Taylor, and Katie Eklund</i>	377

11



GENERAL ARTICLES

11 Seeking Order in Chaos  
*Mendeleev and the Emergence of the Periodic Table*  
Abhinav Godavarthi and S Sivaram

29 Fillable Fractions  
Jyotirmoy Sarkar

51 Stopping and Reversing Climate Change – I  
Frank H Shu

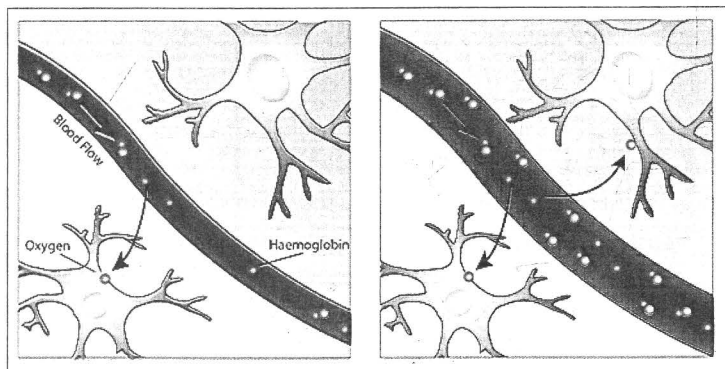
73 The Last Frontier  
*Unraveling the Secrets of the Brain Using Magnetic Resonance*  
Kavita Dorai

29

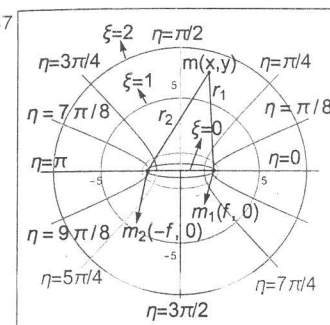


87 An Introduction to the Classical Three-Body Problem  
*From Periodic Solutions to Instabilities and Chaos*  
Govind S Krishnaswami and Himalaya Senapati

73



87



Classics

On the Relationship of the Properties of the Elements to Their Atomic Weights 117  
D Mendelejeff, *Zeitschrift für Chemie*, 12, pp.405–406, 1869; translation by Carmen Giunta



Information & Announcements

Science Academies' Refresher Course in Experimental Physics 122

Front Cover

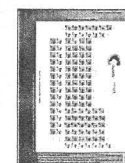


The cover image features the monument to the Periodic Table honoring Dmitri Mendeleev, situated in front of the Faculty of Chemical and Food Technology of the Slovak University of Technology in Bratislava, Slovakia.

Source:

[https://commons.m.wikimedia.org/wiki/File:Periodic\\_table\\_monument.jpg](https://commons.m.wikimedia.org/wiki/File:Periodic_table_monument.jpg)

Back Cover



Periodic Table

Reproduced with permission from the Royal Society of Chemistry, London, UK.

Illustration: Subhankar Biswas

DEPARTMENTS



General Editorial 1

Editorial 5

*N Sathyamurthy*



Science Smiles 7

*Ayan Guha*

Book Review

A Compelling and Complete Account of *p*-Block Chemistry 115

*Ramaswamy Murugavel*

Errata 121

Inside Back Cover

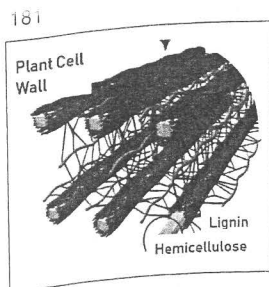
Flowering Trees  
Credit: K Sankara Rao, IISc

Follow us on Facebook

Resonance, Journal of Science Education  
@Resonance.IASc.Bng



**GENERAL ARTICLES**



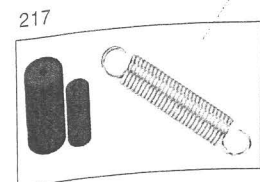
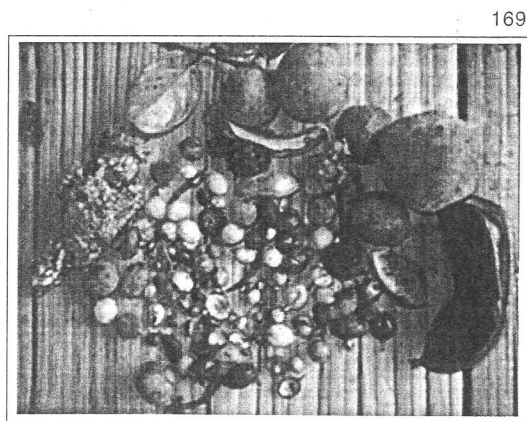
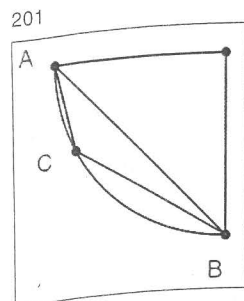
129 **The Life and Work of E C George Sudarshan**  
N Mukunda

169 **The Tree Travelogues**  
*Seed Dispersal by Frugivores*  
Asmita Sengupta

181 **Stopping and Reversing Climate Change – II**  
Frank H. Shu

201 **Brachistochrone – The Path of Quickest Descent**  
Radhakrishnamurty Padyala

217 **Rubber as an Aid to Teach Thermodynamics**  
*The Discovery by a Blind Scientist*  
Geethamma V G and Sampath V



**CLASSROOM**

**Fundamental Theorem of Algebra:** 239  
**A Nevanlinna Theoretic Proof**  
Bikash Chakraborty

**REFLECTIONS**

TWAS Prize Acceptance Speech by Professor E C G Sudarshan on Sunday October 26, 1986 at the Award Ceremony at the International Centre for Theoretical Physics, Trieste, Italy 245



**Information & Announcements**

Science Academies' Refresher Course 253  
on Botany

**Front Cover**



Paul Dirac with E C G Sudarshan at Austin Texas, Spring 1973.

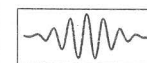
**Back Cover**



E C George Sudarshan  
(1931–2018)

Illustration: Subhankar Biswas

**DEPARTMENTS**



**Editorial** 123  
*N Sathyamurthy*



**Science Smiles** 125  
*Ayan Guha*

**Inside Back Cover**

Night Life

*Mysore Slender Loris*

Photo Credit: Kalyan Varma

Text Credit: Sindhu Radhakrishna

**Follow us on Facebook**

Resonance, Journal of  
Science Education

@Resonance.IASc.Bng

100

# CONTENTS

No. 312 January/February 2019

## 1 WELCOME

## FRONTLINE

---

### 4 NEWS

## ECOLOGIST

---

### 10 ANOTHER CHANCE TO LIVE

Maurice Frank reports on a growing movement to protect Germany's Hambach Forest

### 14 UTOPIA WITH TEETH

Dave Sewell learns how the zad became a beacon of hope in France

### 16 GET UP, STAND UP

Protest is key to protecting our planet, writes Natalie Bennett

### 19 BORN TO BE WILD

Kate Blincoe heads out to watch a seal rookery

## KEYNOTES

---

### 20 EQUALITY OF LIFE: A VISION FOR THE FUTURE

Inequality is making us ill, but we can redress the balance, write Kate Pickett and Richard Wilkinson

## NEW ONLINE

---

### [www.resurgence.org](http://www.resurgence.org)

Jonathan Dawson on bringing the classroom back to life

As a taster, to complement Satish's column, we share a recipe for 'slow' bread

New gallery feature on environmental/expedition artist Alan Campbell

And coming soon to Resurgence Voices: Dale Vince talks about vegan football

### [www.theecologist.org](http://www.theecologist.org)

The stories environmentalists across the globe are talking about, plus opinion pieces and reviews. Check for new daily content, including regular analysis of key political issues. Contact: [editor@theecologist.org](mailto:editor@theecologist.org)

### Social Media

Twitter: @Resurgence\_mag  
@the\_ecologist

Facebook: Resurgencetrust  
TheEcologist

Instagram: @resurgencetrust

### Resurgence & Ecologist App

---

Free access for print members:  
[www.resurgence.org/app](http://www.resurgence.org/app)



Cover image: © 2018 Anna and Elena Balusso c/o theisport

## UNDERCURRENTS

---

### 26 THE DEFINITION OF HAPPINESS

Russell Warfield meets feminist academic and author Lynne Segal

### 28 THE COUNTRYSIDE IS FOR EVERYONE

We need to challenge the idea of Britain's 'white landscape', writes Louisa Adjoa Parker

### 31 BATHING IN CONNECTION

Michelle Brenner elaborates on Forest Therapy and the beauty instinct

## ETHICAL LIVING

- 34 **QWERTY SOMETHING**  
A question from a stranger gets Matt Harvey thinking
- 35 **DIARY**  
Leo Johnson ruminates over the role of government
- 36 **CHOICES**  
Satish Kumar discovers what makes food really wholesome
- 39 **MEDITATION**  
Peter Reason stops to watch low sun on an orchard wall
- 40 **WHERE THE GAS IS GREENER**  
Marianne Brown interviews the founder of Ecotricity, Dale Vince

## ARTS

- 42 **THE REGION OF ICE AND SNOW**  
Adrian Cooper reflects on changing perceptions of Antarctica
- 46 **CALL OF THE WILD**  
A new exhibition showcases the work of printmaker Norman Ackroyd
- 48 **THE CONNECTING THREAD**  
Alice Kettle talks about a project that seeks to show solidarity with refugees and displaced people
- 52 **THE CIRCLE OF LIFE**  
Peter Abbs celebrates the evergreen season
- 54 **SOUL BUILDING**  
Victoria Manthorpe meets eco-architect Christopher Day

## REVIEWS

- 56 **WHERE HUMAN AND ANIMAL MEET**  
Huw Wahl reviews the film *Becoming Animal*, directed by Emma Davie
- 58 **LIVING IN THE SHADOW OF WINTER**  
Jane McNamee reviews *The Light in the Dark: A Winter Journal* by Horatio Clare
- 59 **TRACING A GREEN GRACE**  
Lynne Wycherley reviews *Christina Rossetti: Poetry, Ecology, Faith* by Emma Mason
- 60 **ORDER OUT OF CHAOS**  
Michael McCarthy reviews *The Wonderful Mr Willughby: The First True Ornithologist* by Tim Birkhead
- 62 **AN UNEXPECTED LIFE STORY**  
Satish Kumar reviews *Dear John: The Road to Pelindaba* by Jeff Osment
- 63 **NUCLEAR REACTOR**  
Horatio Morpurgo reviews the film *Wackersdorf*, directed by Oliver Haffner
- 64 **FROM THE GROUND UP**  
Sara Melendro reviews *Dirt to Soil: One Family's Journey into Regenerative Agriculture* by Gabe Brown
- 66 **MEMBERS PAGE**
- 67 **SHOP**
- 68 **LETTERS**
- 70 **ADVERTISEMENTS**

(91)

Editor Emeritus  
Satish Kumar

PA to Satish Kumar  
Elaine Green

Editor-in-chief  
Greg Neale  
greg@resurgence.org

Deputy Editor  
& Podcasts  
Marianne Brown  
marianne@resurgence.org

Designer  
Rachel Marsh

Editorial Assistants &  
Picture Researchers  
Emma Randall  
Emily Martin

Sub-editor  
Helen Banks

Poetry Editor  
Peter Abbs

Trust Manager  
Angie Burke

Accounts Officer  
Mark Gough

The Ecologist Editor  
Brendan Montague  
brendan@theecologist.org

Fundraising Manager  
Sharon Garfinkel  
+44 (0)7435 781842  
sharon@resurgence.org

Membership  
Jeanette Gill  
Mandy Kessell  
+44 (0)1208 841824  
members@resurgence.org

Office Manager &  
Classified Advertising  
Lynn Batten  
info@resurgence.org  
+44 (0)1237 441293  
info@resurgence.org

Advertising Sales  
Dan Raymond-Barker  
+44 (0)7776 361671  
dan@emsm.org.uk

Editorial Office  
Ford House, Hartland,  
Bideford, Devon  
EX39 6EE, UK  
+44 (0)1237 441293  
www.resurgence.org

*Resurgence & Ecologist*  
is published by The  
Resurgence Trust, a  
registered educational  
charity (no. 1120414)



# Contents

School Science Review December 2018, 100(371)

- 5 Editorial**
- 6 Letter**
- 9 Science notes**
  - 9 **Laboratory demonstrations of reacting elements to form simple compounds** *Keith Ross*
  - 12 **The use of a toy balloon helicopter to teach various aspects of science** *Steven Weir*
- 15 Pitch Perfect: investigating the effects of different wavelengths of light on the rate of photosynthesis and grass growth**  
*Richard Spencer*  
An investigation into the effect of the colour of light on the rate of photosynthesis of grass to promote rapid recovery of damaged areas of football pitches after each game
- 21 Using a 3D printer in science education**  
*Klaus Blachut*  
How a group of German school students used a 3D printer to develop helpful tools for chemistry lessons
- 24 Two uses of smart materials**  
*Catherine Dunn*  
Easy ways to demonstrate temperature-sensing with thermochromic paint and to measure force with Electrolycra
- 29 Theme editorial: Science with and for society**  
*Ruth Amos, Marie-Christine Knippels, Elena Kyza and Ralph Levinson*
- 31 Introducing socio-scientific inquiry-based learning (SSIBL)**  
*Ralph Levinson*  
A model of socio-scientific inquiry-based learning to foster democratic citizenship is justified and discussed through examples
- 36 Collaborative science teacher education through inquiry on climate issues**  
*Diana Radmann, Franz Rauch and Bernhard Schmölzer*  
The project 'Mobility, Traffic and Renewable Energies' exemplifies collaborative inquiry in climate issues in Carinthian schools; pre-service teachers and students engage in real-world issues relating to their lived environment
- 40 Empowering teachers to bring authenticity and responsive action into the science classroom**  
*Marta Romero-Ariza, Ana M. Abril and Antonio Quesada*  
This work provides examples to support teachers in the design of learning scenarios that enable students to make informed decisions and take actions on problems related to science and technology
- 46 An educational sequence for implementing socio-scientific inquiry-based learning (SSIBL)**  
*Marie-Christine P.J. Knippels and Michiel van Harskamp*  
Pedagogical tools to support pre-service science teachers in the different stages of SSIBL to foster democratic citizenship, illustrated with concrete activities for classroom practice
- 53 Antibiotics in livestock: introducing in-service teachers to the nature of contemporary socio-scientific controversies**  
*Eleni A. Kyza, Yiannis Georgiou, Andreas Hadjichambis and Andria Agesilaou*  
An experiential activity organised around a contemporary socio-scientific controversy about the use of antibiotics in livestock that can be used as an introduction to socio-scientific controversies
- 59 Really working scientifically: strategies for engaging students with socio-scientific inquiry-based learning (SSIBL)**  
*Ruth Amos and Andri Christodoulou*  
Activities designed for and used with pre-service teachers learning to implement SSIBL in practice, with a focus on raising authentic questions and working with evidence within societal contexts.

- 66 Using educational neuroscience and psychology to teach science. Part 2: A case study review of 'The Brain-Targeted Teaching Model' and 'Research-Based Strategies to Ignite Student Learning'**  
*Rebecca Torrance Jenkins*  
 A research project to develop teaching techniques based on improving teachers' understanding of how the brain learns, and how to align teaching accordingly
- 76 Open badges Part 1: what, why, how?**  
*Naomi Hennah*  
 A mechanism to enhance existing assessment systems is described into which both the criteria and evidence may be embedded
- 81 Open badges Part 2: the 'Working Scientifically' framework**  
*Naomi Hennah*  
 A key stage 1 to post-16 assessment framework informed by cognitive load theory to facilitate language and manipulative skills mastery
- 91 Reviews**
- 99 Science app reviews**
- 101 Science websearch**
- 104 SSR special issues and Advertisers index**

## Health & Safety

For all practical procedures described in *SSR*, we have attempted to ensure that:

- all recognised hazards have been identified;
- appropriate precautions are suggested;
- where possible procedures are in accordance with commonly adopted model risk assessments;
- if a special risk assessment is likely to be necessary this is highlighted.

However errors and omissions can be made, and employers may have adopted different standards. Therefore, before any practical activity, teachers should always check their employer's assessment. Any local rules issued by their employer must be obeyed, whatever is recommended in *SSR*.

Unless the context dictates otherwise it is assumed that:

- practical work is conducted in a properly equipped laboratory;
- any mains-operated and other equipment is properly maintained;
- any fume cupboard operates at least to the standard of CLEAPSS Guide G9;
- care is taken with normal laboratory operations such as heating substances or handling heavy objects;
- good laboratory practice is observed when chemicals or living organisms are handled;
- eye protection is worn whenever there is any recognised risk to the eyes;
- fieldwork takes account of any guidelines issued by the employer;
- pupils are taught safe techniques for such activities as heating chemicals or smelling them, and for handling microorganisms.

Readers requiring further guidance are referred to:

*Hazcards* (CLEAPSS, 2016 and updates)

*Topics in Safety*, 3rd edn (ASE, 2001; updates available at [www.ase.org.uk/resources/topics-in-safety](http://www.ase.org.uk/resources/topics-in-safety))

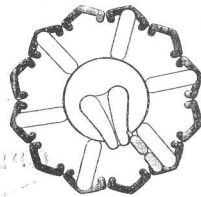
*Safeguards in the School Laboratory*, 11th edn (ASE, 2006)

*Preparing COSHH Risk Assessments for Project Work in Schools* (SSERC, 1991)

SSERC hazardous chemicals database ([www.sserc.org.uk/health-safety/chemistry-health-safety/hazchem\\_database-2/](http://www.sserc.org.uk/health-safety/chemistry-health-safety/hazchem_database-2/))

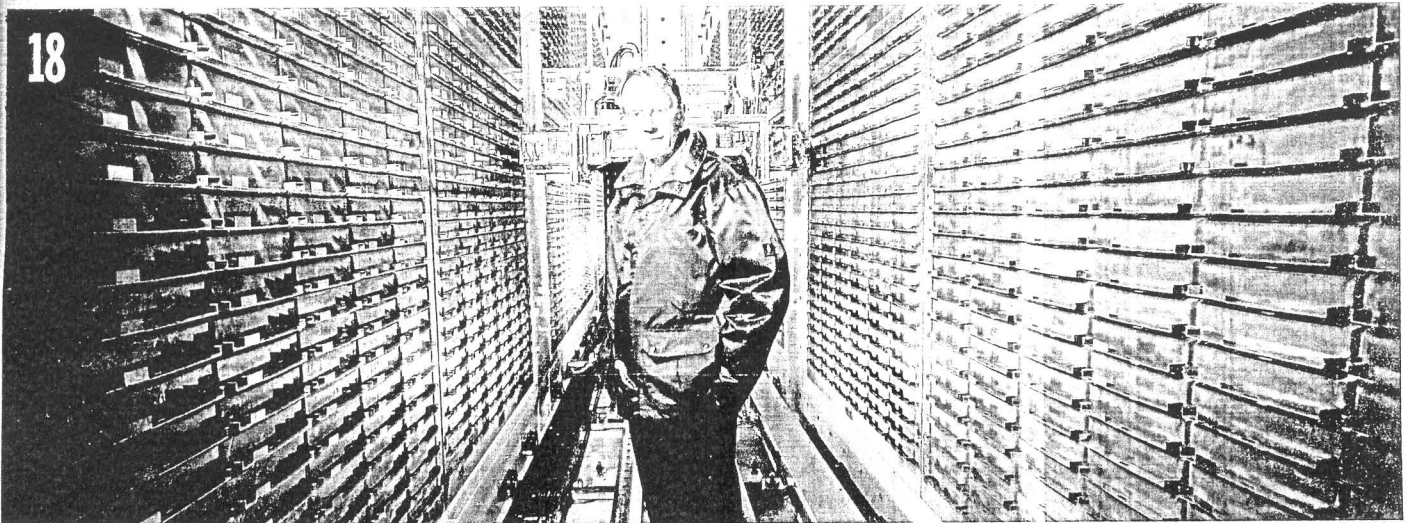
*Be Safe! Health and Safety in School Science and Technology for Teachers of 3- to 12 Year-olds*, 4th edn (ASE, 2011)

# CONTENTS



Internalizing receptors to forget

4 JANUARY 2019 • VOLUME 363 • ISSUE 6422



18

## NEWS

### IN BRIEF

What to expect in 2019

### IN DEPTH

#### THE WORLD DEBATES OPEN-ACCESS MANDATES

Spurred by European funders behind Plan S, many countries consider similar moves *By T. Rabesandratana*

#### TROPICAL UPLIFT MAY SET EARTH'S THERMOSTAT

Indonesia's mountains could be cause of current glacial age *By P. Voosen*

#### COMPUTERS TURN NEURAL SIGNALS INTO SPEECH

Fed data from invasive brain recordings, algorithms reconstruct heard and spoken sounds *By K. Servick*

#### DO PLANTS FAVOR THEIR KIN?

Once considered outlandish, the idea that plants help their relatives is taking root *By E. Pennisi*

#### ASTEROID MISSION FACES 'BREATHTAKING' TOUCHDOWN

As first data roll in from Hayabusa2, engineers plan descent to rocky surface *By D. Normile*

### FEATURES

#### BIOLOGY IN THE BANK

How an open-access trove of data on Britons is unlocking the genetics of disease, behavior, and physical traits *By J. Kaiser and A. Gibbons*

#### SPOTTING EVOLUTION AMONG US

The half-million people in the UK Biobank hold the genetic legacy of Neanderthals—and clues to how we are still evolving *By A. Gibbons*

## INSIGHTS

### PERSPECTIVES

#### FLOWING CROWDS

Modeling human crowds as a fluid allows prediction of group behavior *By N. T. Ouellette*

#### THE SOUND OF A TROPICAL FOREST

Recording of forest soundscapes can help monitor animal biodiversity for conservation *By Z. Burivalova et al.*

#### UNDERSTANDING LASSA FEVER

Genomics study informs about Lassa fever epidemiology *By N. Bhadelia*

#### WEAKENING SYNAPSES TO CULL MEMORIES

Calcium sensor synaptotagmin-3 helps weaken synaptic strength and supports forgetting *By N. J. Mandelberg and R. Tsien*

#### IMPROVING CROP YIELD

Synthetic photorespiration bypass increases crop yield *By M. Eisenhut and A. P. M. Weber*

#### REALLY COOL NEUTRAL PLASMAS

Properties of laser-cooled neutral plasmas can be used to model high-energy-density plasmas *By S. Bergeson*

### POLICY FORUM

#### FROM VOLUNTARY COMMITMENTS TO OCEAN SUSTAINABILITY

A common pledge and review system is needed *By B. Neumann and S. Unger*

### BOOKS ET AL.

#### A MILITARY ALLIANCE GOES GREEN

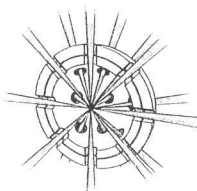
Seeking solutions to Cold War divisions, in the mid-20th century NATO embraced environmentalism *By D. Degroot*

#### ROBOTS, TELEWORK, AND THE JOBS OF THE FUTURE

Globalization and AI are primed to disrupt tomorrow's workplace, argues an economist *By J. Peha*

CREDITS: (GRAPHIC) V. ALTOUNIAN/SCIENCE; (PHOTO) NIGEL HILLER

95



Ultracold plasma

# CONTENTS

4 JANUARY 2019 • VOLUME 363 • ISSUE 6422

## LETTERS

**24 NEXTGEN VOICES: CHALLENGING TRANSITIONS**

## RESEARCH

### IN BRIEF

**39** From *Science* and other journals

### REVIEW

#### 42 OPTICS

Exceptional points in optics and photonics *M.-A. Miri and A. Alù*

REVIEW SUMMARY; FOR FULL TEXT: [dx.doi.org/10.1126/science.aar7709](https://doi.org/10.1126/science.aar7709)

### RESEARCH ARTICLES

#### 43 IMMUNOLOGY

Commensal-specific T cell plasticity promotes rapid tissue adaptation to injury *O. J. Harrison et al.*

RESEARCH ARTICLE SUMMARY; FOR FULL TEXT: [dx.doi.org/10.1126/science.aai6280](https://doi.org/10.1126/science.aai6280)

#### 44 NEUROSCIENCE

Synaptotagmin-3 drives AMPA receptor endocytosis, depression of synapse strength, and forgetting *A. Awasthi et al.*

RESEARCH ARTICLE SUMMARY; FOR FULL TEXT: [dx.doi.org/10.1126/science.aav1483](https://doi.org/10.1126/science.aav1483)

▶ PERSPECTIVE P. 31

#### 45 PLANT SCIENCE

Synthetic glycolate metabolism pathways stimulate crop growth and productivity in the field *P. F. South et al.*

RESEARCH ARTICLE SUMMARY; FOR FULL TEXT: [dx.doi.org/10.1126/science.aat9077](https://doi.org/10.1126/science.aat9077)

▶ PERSPECTIVE P. 32

### REPORTS

#### 46 CROWD DYNAMICS

Dynamic response and hydrodynamics of polarized crowds *N. Bain and D. Bartolo*

▶ PERSPECTIVE P. 27; VIDEO

#### 49 CHEMICAL PHYSICS

Rovibrational quantum state resolution of the C<sub>60</sub> fullerene *P. B. Changala et al.*



#### 54 MESOSCOPIC PHYSICS

Counter-propagating charge transport in the quantum Hall effect regime *F. Lafont et al.*

#### 57 NANOMATERIALS

Fluorine-programmed nanozipping to tailored nanographenes on rutile TiO<sub>2</sub> surfaces *M. Kolmer et al.*

#### 61 ATOMIC PHYSICS

Laser cooling of ions in a neutral plasma *T. K. Langin et al.*

▶ PERSPECTIVE P. 33

#### 64 NEUROSCIENCE

A collicular visual cortex: Neocortical space for an ancient midbrain visual structure *R. Beltramo and M. Scanziani*

#### 70 CLIMATE CHANGE

The Little Ice Age and 20th-century deep Pacific cooling *G. Gebbie and P. Huybers*

#### 74 VIROLOGY

Metagenomic sequencing at the epicenter of the Nigeria 2018 Lassa fever outbreak *L. E. Kafetzopoulou et al.*

▶ PERSPECTIVE P. 30

#### 78 PALEONTOLOGY

An elephant-sized Late Triassic synapsid with erect limbs *T. Sulej and G. Niedzwiedzki*

#### 83 EVOLUTION

DNA fragility in the parallel evolution of pelvic reduction in stickleback fish *K. T. Xie et al.*

#### 84 PROTEIN TRANSLOCATION

Structure of the posttranslational Sec protein-translocation channel complex from yeast *S. Itskanov and E. Park*

#### 88 PROKARYOTIC IMMUNITY

Functionally diverse type V CRISPR-Cas systems *W. X. Yan et al.*

### DEPARTMENTS

#### 7 EDITORIAL

Examining author gender data *By Jeremy Berg*

#### 88 WORKING LIFE

Lessons from the 'real world' *By Barbara A. Wanchisen*

### ON THE COVER



Artist's rendering of an early morning in Silesia, Poland, during the Late Triassic. The elephant-sized dicynodont *Lisowicia bojani*, a distant cousin of present-day mammals, plods slowly through

the woodland as graceful theropod dinosaurs search for prey. In the foreground, the mammalian ancestor *Hallautherium* moves cautiously along a branch. *Lisowicia*, the largest known dicynodont, had upright limbs and walked with an erect gait, similar to modern mammals. See page 78. *Illustration: Julius Csotomay*

Science Staff ..... 6  
Science Careers ..... 94

CREDITS: (PHOTO) MARCO MEGA/ALAMY STOCK PHOTO; (GRAPHIC) C. BICKEL/SCIENCE

SCIENCE (ISSN 0036-8075) is published weekly on Friday, except last week in December, by the American Association for the Advancement of Science, 1200 New York Avenue, NW, Washington, DC 20005. Periodicals mail postage (publication No. 484460) paid at Washington, DC, and additional mailing offices. Copyright © 2019 by the American Association for the Advancement of Science. The title SCIENCE is a registered trademark of the AAAS. Domestic individual membership, including subscription (12 months): \$165; (\$74 allocated to subscription). Domestic institutional subscription (51 issues): \$1971; Foreign postage extra: Mexico, Caribbean (surface mail) \$55; other countries (air assist delivery): \$98. First class, airmail, student, and emeritus rates on request. Canadian rates with GST available upon request. GST #R125488122. Publications Mail Agreement Number 1069624. Printed in the U.S.A. Change of address: Allow 4 weeks, giving old and new addresses and 8-digit account number. Postmaster: Send change of address to AAAS, P.O. Box 96178, Washington, DC 20090-6178. Single-copy sales: \$15 each plus shipping and handling, bulk rate on request. Authorization to reproduce material for internal or personal use under circumstances not falling within the fair use provisions of the Copyright Act is granted by AAAS to libraries and others who use Copyright Clearance Center (CCC), www.copyright.com. The identification code for Science is 0036-8075. Science is indexed in the Reader's Guide to Periodical Literature and in several specialized indexes.

12/29/2019

©

# CONTENTS



Tuning Weyl points

11 JANUARY 2019 • VOLUME 363 • ISSUE 6423



## NEWS

### IN BRIEF

News at a glance

### IN DEPTH

#### SHUTDOWN STARTS TO TAKE A BITE OUT OF SCIENCE

As agency closures enter third week, effects ripple across research community *By D. Malakoff*

#### JAPAN'S EXIT FROM WHALING GROUP MAY BENEFIT WHALES

Commercial whaling will replace a controversial research program, but the market for whale meat is declining *By D. Normile*

#### HOW TO SHINE IN INDONESIAN SCIENCE? GAME THE SYSTEM

Researchers object to a metric that was easy to manipulate *By D. Rochmyaningsih*

#### SHIPS BANNED FROM THROWING UNWANTED FISH OVERBOARD

Controversial European policy worries industry while environmentalists fear rampant cheating *By E. Stokstad*

#### RESEARCHERS OBJECT TO CENSUS PRIVACY MEASURE

New approach to preserving confidentiality could harm data quality, critics say *By J. Mervis*

#### NEW HORIZONS INSPECTS A DISTANT TIME CAPSULE

Kuiper belt "snowman" supports idea that planetary building blocks coalesced from clumps of pebbles *By P. Voosen*

### FEATURE

#### SEEING THE DAWN

Evidence lines up to offer a new view of how life on our planet may have emerged *By R. S. Service*

## INSIGHTS

### PERSPECTIVES

#### ARE CLEVER MALES PREFERRED AS MATES?

Testing this Darwinian hypothesis is a tough nut to crack *By G. F. Striedter and N. T. Burley*

#### DEMOCRATIZING SYNTHESIS BY AUTOMATION

Computer code directs interconnected modules that perform primary steps of synthesis *By A. Milo*

#### NEURONAL FUNCTION OF ALZHEIMER'S PROTEIN

Cleavage products of an Alzheimer's disease protein are involved in synaptic homeostasis *By M. Korte*

#### MANY PATHS TO PRESERVE THE BODY CLOCK

Daily clocks in astrocytes in the brain can drive behavioral rhythmicity *By C. B. Green*

#### ASSEMBLING HUMAN BRAIN ORGANOIDS

Three-dimensional assembloids can be used to study human development and disease *By S. P. Pasca*

#### HOW FAST ARE THE OCEANS WARMING?

Observational records of ocean heat content show that ocean warming is accelerating *By L. Cheng et al.*

### POLICY FORUM

#### THE MOOC PIVOT

What happened to disruptive transformation of education? *By J. Reich and J. A. Ruipérez-Valiente*

### BOOKS ET AL.

#### CHEAP OIL VS. CLIMATE CHANGE

The Gulf struggles to reform subsidies as temperatures and domestic energy demand rise *By M. R. Aczel*

#### THE FUTURE IS FIBER

Faster, cheaper, and more versatile than traditional telecom hardware, U.S. fiber networks still face policy hurdles *By V. Mayer-Schönberger*

GRAPHIC: H. JIA ET AL.; (PHOTO) AFCC IMAGES/GETTY IMAGES/ALAMY STOCK PHOTO

## LETTERS

**134 INTEGRATED DATA COULD AUGMENT RESILIENCE**By *F. Vahedifard et al.***134 WILDFIRES: OPPORTUNITY FOR RESTORATION?**By *A. B. Leverkus et al.***135 PROTECT CATALONIA'S CORALS DESPITE POLITICS**By *N. Arafeh-Dalman et al.***136 TECHNICAL COMMENT ABSTRACTS****RESEARCH**

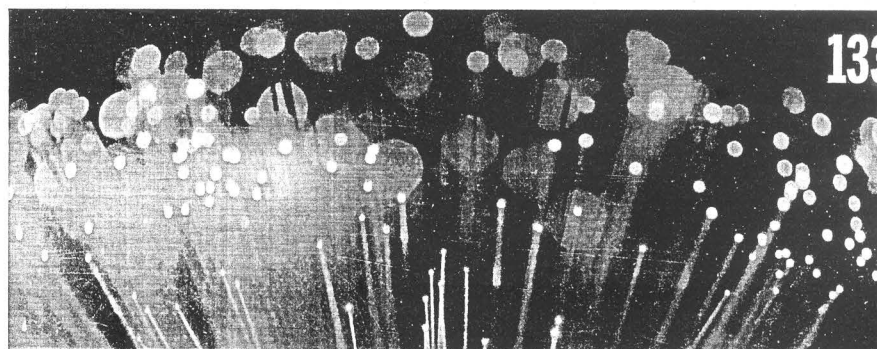
## IN BRIEF

**137** From *Science* and other journals

## REVIEW

**140 IMMUNOMETABOLISM**An evolutionary perspective on immunometabolism *A. Wang et al.*REVIEW SUMMARY; FOR FULL TEXT:  
[dx.doi.org/10.1126/science.aar1180](https://doi.org/10.1126/science.aar1180)

## RESEARCH ARTICLES

**141 MOLECULAR BIOLOGY**Cap-specific terminal N<sup>6</sup>-methylation of RNA by an RNA polymerase II-associated methyltransferase *S. Akichika et al.*RESEARCH ARTICLE SUMMARY; FOR FULL TEXT:  
[dx.doi.org/10.1126/science.aar1180](https://doi.org/10.1126/science.aar1180)**142 IMMUNOLOGY**Chronic TLR7 and TLR9 signaling drives anemia via differentiation of specialized hemophagocytes *H. M. Akilesh et al.*RESEARCH ARTICLE SUMMARY; FOR FULL TEXT:  
[dx.doi.org/10.1126/science.aar1181](https://doi.org/10.1126/science.aar1181)**143 NEUROSCIENCE**Secreted amyloid- $\beta$  precursor protein functions as a GABA<sub>A</sub> R1a ligand to modulate synaptic transmission *H. C. Rice et al.*RESEARCH ARTICLE SUMMARY; FOR FULL TEXT:  
[dx.doi.org/10.1126/science.aar1182](https://doi.org/10.1126/science.aar1182)  
▶ PERSPECTIVE P. 123**144 CHEMISTRY**Organic synthesis in a modular robotic system driven by a chemical programming language *S. Steiner et al.*RESEARCH ARTICLE SUMMARY; FOR FULL TEXT:  
[dx.doi.org/10.1126/science.aar1183](https://doi.org/10.1126/science.aar1183)  
▶ PERSPECTIVE P. 122

133

## REPORTS

**145 MEMBRANES**Complete steric exclusion of ions and proton transport through confined monolayer water *K. Gopinadhan et al.***145 TOPOLOGICAL OPTICS**Observation of chiral zero mode in inhomogeneous three-dimensional Weyl metamaterials *H. Jia et al.***151 ORGANIC CHEMISTRY**Finite phenine nanotubes with periodic vacancy defects *Z. Sun et al.***155 SURFACE CHEMISTRY**Site-specific reactivity of molecules with surface defects—the case of H<sub>2</sub> dissociation on Pt *R. van Lent et al.***158 CHEMICAL PHYSICS**The Sommerfeld ground-wave limit for a molecule adsorbed at a surface *L. Chen et al.***161 CHEMISTRY**Nematic-to-columnar mesophase transition by in situ supramolecular polymerization *K. Yano et al.***166 SEXUAL SELECTION**Problem-solving males become more attractive to female budgerigars *J. Chen et al.*

▶ PERSPECTIVE P. 120

**168 NEUROSCIENCE**Emergence of preconfigured and plastic time-compressed sequences in early postnatal development *U. Farooq and G. Dragoi***174 TROPICAL ECOLOGY**Termites mitigate the effects of drought in tropical rainforest *L. A. Ashton et al.***177 PALEOECOLOGY**A 90,000-year record of Afromontane forest responses to climate change *A.-M. Lézine et al.***181 ANTIBIOTIC RESISTANCE**Invertible promoters mediate bacterial phase variation, antibiotic resistance, and host adaptation in the gut *X. Jiang et al.***187 CIRCADIAN RHYTHMS**Cell-autonomous clock of astrocytes drives circadian behavior in mammals *M. Brancaccio et al.*

▶ PERSPECTIVE P. 124

## DEPARTMENTS

**105 EDITORIAL**A fresh look at nuclear energy *By John Parsons et al.***108 WORKING LIFE**The scars we bear *By Robert S. Schick*

## ON THE COVER

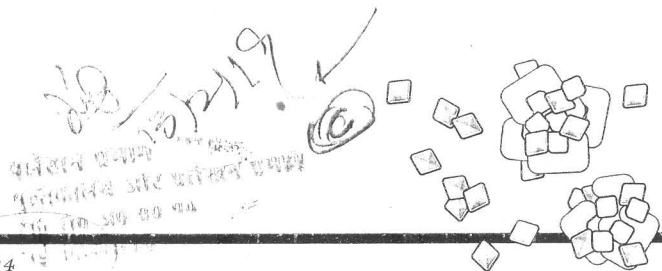
Worker termites (*Longipeditermes longipes*) carry masticated leaves back to their colony in the rainforest of Malaysia Borneo. Processionary termites are important decomposers of leaf

litter and can confer ecosystem resilience as these insects often thrive during periods of environmental stress. Consequently, during drought, an uptick in termite activity and abundance leads to increased soil moisture, soil nutrient heterogeneity, leaf litter decomposition, and seedling survival. See page 174. Photo: Chien C. Lu

New Products.....  
Science Careers.....

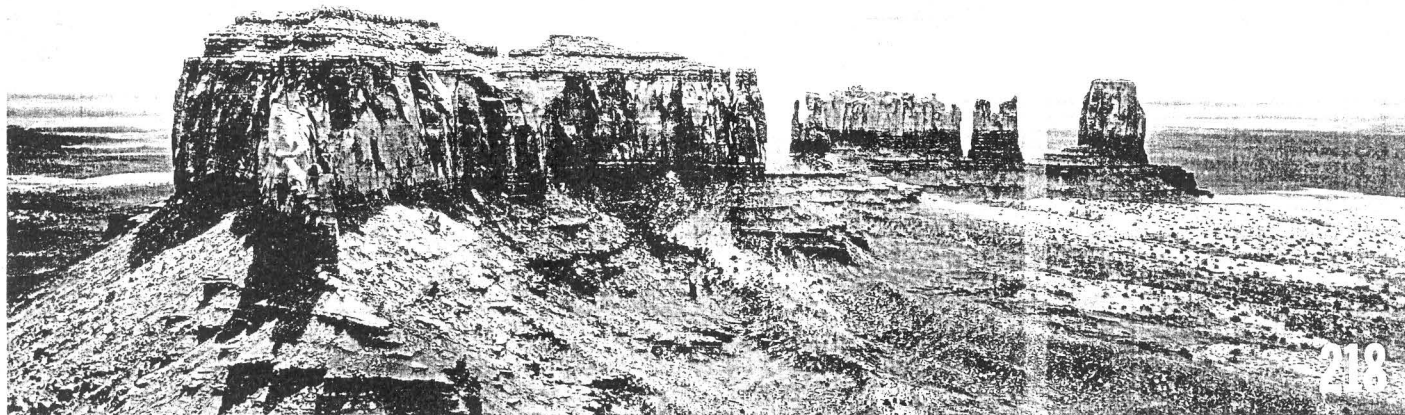
SCIENCE (ISSN 0036-8075) is published weekly on Friday, except last week in December, by the American Association for the Advancement of Science, 1200 New York Avenue, NW, Washington, DC 20005. Periodicals postage (publication No. 484460) paid at Washington, DC, and additional mailing offices. Copyright © 2019 by the American Association for the Advancement of Science. The title SCIENCE is a registered trademark of the AAAS. For individual membership, including subscription (12 months): \$165 (\$74 allocated to subscription). Domestic institutional subscription (51 issues): \$1971. Foreign postage extra: Mexico, Caribbean (surface mail) \$55; other countries (airmail): \$98. First class, airmail, student, and emeritus rates on request. Canadian rates with GST available upon request. GST #125488122. Publications Mail Agreement Number 1069624. Printed in the U.S.A. Change of address: Allow 4 weeks, giving old and new addresses and 8-digit account number. Postmaster: Send change of address to AAAS, P.O. Box 96178, Washington, DC 20090-6178. Single-copy sales: \$15 each plus shipping and handling; bulk rate on request. Authorization to reproduce material for internal or personal use under circumstances not falling within the fair use provisions of the Copyright Act can be obtained through the Copyright Clearance Center (CCC), www.copyright.com. The identification code for Science is 0036-8075. Science is indexed in the Reader's Guide to Periodical Literature and in several specialized indexes.

CONTENTS



211  
Deadly pileups  
of proteins

18 JANUARY 2019 • VOLUME 363 • ISSUE 6424



NEWS

IN BRIEF

208 News at a glance

IN DEPTH

211 SHAKE-UP THREATENS NOVEL U.S. ECOLOGY FACILITY

NEON science head quits, advisers fired after Battelle replaces two top managers *By J. Mervis*

212 DID NEURONS ARISE FROM AN EARLY SECRETORY CELL?

Cell lineage studies of comb jellies and other creatures may suggest a single ancient origin of the nervous system *By E. Pennisi*

213 IN CONGO, FIGHTING A VIRUS AND A GROUNDSWELL OF FAKE NEWS

Armed conflict and political tensions stoke rumors and misinformation about Ebola *By L. Spinney*

▶ PODCAST

214 DUELING SPACECRAFT LOOK DEEP INTO SATURN AND JUPITER

NASA probes reveal surprising contrasts between two gas giants *By P. Voosen*

▶ RESEARCH ARTICLE BY L. IESS ET AL.

10.1126/science.aat2965; PODCAST

216 PAIN SPREADS FROM SHUTDOWN

Historic spending impasse halts paychecks and projects *By D. Malakoff*

217 FLOTILLA LAUNCHES LARGE SURVEY OF ANTARCTIC KRILL

Health of stock is critical to fishery—and to predators *By E. Stockstad*

FEATURES

218 THE BONES OF BEARS EARS

Paleontologists struggle to protect sites that could rewrite Earth's history *By A. Reese*

221 THE BRAIN'S TRAFFIC PROBLEMS

Disrupted flow into and out of the nucleus may kill neurons *By E. Dolgin*

INSIGHTS

PERSPECTIVES

224 WHEN EARTH GOT PUMMELED

The frequency of impacts on Earth's surface increased about 290 million years ago *By C. Koerberl*

▶ REPORT P. 253

225 IRON HITS THE MARK

Strongly electron-donating ligands enable nanosecond lifetimes of iron(III) photoexcited states

*By E. R. Young and A. Oldacre*

▶ REPORT P. 249

227 MICROBIAL GUARDIANS OF SKIN HEALTH

Skin microbes can promote skin immunity, repair, and antimicrobial defense *By A. Stacy and Y. Belkaid*

229 THE CEREBELLUM GETS SOCIAL

The cerebellum can regulate behavior by controlling dopamine release

*By E. D'Angelo*

▶ RESEARCH ARTICLE P. 248

231 ADAPTATIONS OF AN ANCIENT MODULAR MACHINE

Mechanism of energy conversion is conserved in the complex I superfamily

*By U. Brandt*

▶ REPORT P. 257

231 GENE THERAPY FOR PATHOLOGIC GENE EXPRESSION

Haploinsufficiency in disease can be overcome by boosting gene expression with CRISPR

*By L. E. Montefiori and M. A. Nobrega*

▶ RESEARCH ARTICLE P. 246

233 B CELLS, CMV, AND STEM CELL TRANSPLANT

Host antibodies help prevent CMV dissemination after bone marrow transplantation *By M.-L. Alegre*

▶ REPORT P. 288

POLICY FORUM

231 OVERSIGHT OF DIRECT-TO-CONSUMER NEUROTECHNOLOGIES

Efficacy of products is far from clear *By A. Weisler and P. B. Reiner*

BOOKS ET AL.

231 THE REVEALING HISTORY OF A REVERED WATERWAY

Human and environmental stories interweave in a meandering meditation on the Ganges River *By A. Rademacher*

GRAPHIC: V. ALTOUNIAN/SCIENCE PHOTO; CAVAN SOCIAL/ALAMY/STOCK PHOTO

199

**237 NUCLEAR POWER AND PROMISE**

Deference to industry trumps safety in the U.S., warns a controversial former regulator  
By *J. D. Hamblin*

**LETTERS**

**239 THE VALUE OF SMALL MANGROVE PATCHES**

By *D. J. Curnick et al.*

**240 BRAZIL'S ENDANGERED POSTGRADUATE SYSTEM**

By *H. Martelli Júnior et al.*

**240 AIRBORNE IN THE ERA OF CLIMATE CHANGE**

By *K. Jean and C. Wymant*

**RESEARCH**

**IN BRIEF**

**241** From *Science* and other journals

**REVIEW**

**244 ORGANIC CHEMISTRY**

The importance of synthetic chemistry in the pharmaceutical industry  
*K. R. Campos et al.*

REVIEW SUMMARY; FOR FULL TEXT: [dx.doi.org/10.1126/science.aat0805](https://doi.org/10.1126/science.aat0805)

**RESEARCH ARTICLES**

**245 IMAGING TECHNIQUES**

Cortical column and whole-brain imaging with molecular contrast and nanoscale resolution  
*R. Gao et al.*

RESEARCH ARTICLE SUMMARY; FOR FULL TEXT: [dx.doi.org/10.1126/science.aau8302](https://doi.org/10.1126/science.aau8302)

**246 GENE THERAPY**

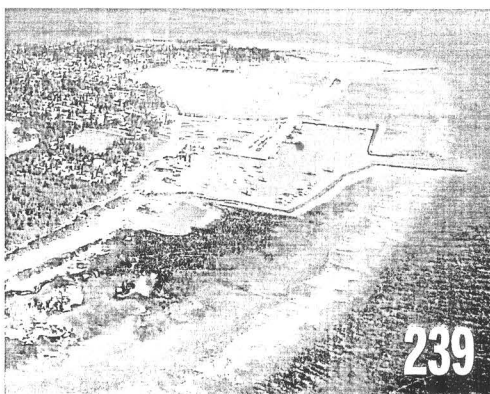
CRISPR-mediated activation of a promoter or enhancer rescues obesity caused by haploinsufficiency  
*N. Matharu et al.*

RESEARCH ARTICLE SUMMARY; FOR FULL TEXT: [dx.doi.org/10.1126/science.aau0629](https://doi.org/10.1126/science.aau0629)  
▶ PERSPECTIVE P. 231

**247 ASYMMETRIC CATALYSIS**

Prediction of higher-selectivity catalysts by computer-driven workflow and machine learning  
*A. F. Zahrt et al.*

RESEARCH ARTICLE SUMMARY; FOR FULL TEXT: [dx.doi.org/10.1126/science.aau5631](https://doi.org/10.1126/science.aau5631)



**248 NEUROSCIENCE**

Cerebellar modulation of the reward circuitry and social behavior  
*I. Carta et al.*

RESEARCH ARTICLE SUMMARY; FOR FULL TEXT: [dx.doi.org/10.1126/science.aav0581](https://doi.org/10.1126/science.aav0581)  
▶ PERSPECTIVE P. 229

**REPORTS**

**249 INORGANIC CHEMISTRY**

Luminescence and reactivity of a charge-transfer excited iron complex with nanosecond lifetime  
*K. S. Kjær et al.*

▶ PERSPECTIVE P. 225

**253 IMPACT CRATERS**

Earth and Moon impact flux increased at the end of the Paleozoic  
*S. Mazrouei et al.*

▶ PERSPECTIVE P. 224

**257 PHOTOSYNTHESIS**

Structural adaptations of photosynthetic complex I enable ferredoxin-dependent electron transfer  
*J. M. Schuller et al.*

▶ PERSPECTIVE P. 230

**261 CHEMICAL PHYSICS**

Observation of magnetically tunable Feshbach resonances in ultracold  $^{23}\text{Na}^{40}\text{K} + ^{40}\text{K}$  collisions  
*H. Yang et al.*

**265 SOLAR CELLS**

A  $\text{Eu}^{3+}\text{-Eu}^{2+}$  ion redox shuttle imparts operational durability to Pb-I perovskite solar cells  
*L. Wang et al.*

**270 ORGANIC CHEMISTRY**

Concise total syntheses of (-)-jorunnamycin A and (-)-jorumycin enabled by asymmetric catalysis  
*E. R. Welin et al.*

**276 NEUROSCIENCE**

An amygdalar neural ensemble that encodes the unpleasantness of pain  
*G. Corder et al.*

**282 BIODIVERSITY**

Agriculturally dominated landscapes reduce bee phylogenetic diversity and pollination services  
*H. Grab et al.*

**285 CILIA**

Flagellar microtubule doublet assembly in vitro reveals a regulatory role of tubulin C-terminal tails  
*M. Schmidt-Cernohorska et al.*

**288 IMMUNOTHERAPY**

Strain-specific antibody therapy prevents cytomegalovirus reactivation after transplantation  
*J. P. Martins et al.*

▶ PERSPECTIVE P. 232

**294 CELL DIFFERENTIATION**

H3K9me3-heterochromatin loss at protein-coding genes enables developmental lineage specification  
*D. Nicetto et al.*

**DEPARTMENTS**

**207 EDITORIAL**

Why we need fetal tissue research  
By *Sally Temple and Lawrence S. B. Goldstein*

**314 WORKING LIFE**

Lessons from a postdoc gone wrong  
By *Victor S. C. Wong*

**ON THE COVER**



A three-dimensional micrograph, color coded by depth, of neurons at the ellipsoid body in the brain of a fruit fly (*Drosophila melanogaster*), extracted from a much larger dataset

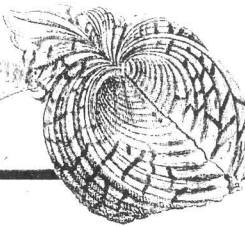
encompassing the entire brain. Combining expansion microscopy with lattice light-sheet microscopy enables rapid fluorescence imaging of neural circuits and their molecular constituents over millimeter dimensions with nanoscale resolution. See page 245. Image: *Betzig Lab, Janelia Research Campus/HHMI; Boyden Lab, MIT Media Lab*

Science Staff ..... 206  
New Products ..... 298  
AAAS Meeting Program ..... 299  
Science Careers ..... 309

SCIENCE (ISSN 0036-8075) is published weekly on Friday, except last week in December, by the American Association for the Advancement of Science, 1200 New York Avenue, NW, Washington, DC 20005. Periodicals mail postage (publication No. 484460) paid at Washington, DC, and additional mailing offices. Copyright © 2019 by the American Association for the Advancement of Science. The title SCIENCE is a registered trademark of the AAAS. Domestic individual membership, including subscription (12 months): \$165 (\$74 allocated to subscription). Domestic institutional subscription (51 issues): \$1971. Foreign postage extra: Mexico, Caribbean (surface mail) \$55; other countries (air assist delivery): \$98. First class, airmail, student, and emeritus rates on request. Canadian rates with GST available upon request. GST #R125488122. Publications Mail Agreement Number 1069624. Printed in the U.S.A. Change of address: Allow 4 weeks, giving old and new addresses and 8-digit account number. Postmaster: Send change of address to AAAS, P.O. Box 96178, Washington, DC 20090-6178. Single-copy sales: \$15 each plus shipping and handling; bulk rate on request. Authorization to reproduce material for internal or personal use under circumstances not falling within the fair use provisions of the Copyright Act can be obtained through the Copyright Clearance Center (CCC), www.copyright.com. The identification code for Science is 0036-8075. Science is indexed in the Reader's Guide to Periodical Literature and in several specialized indexes.

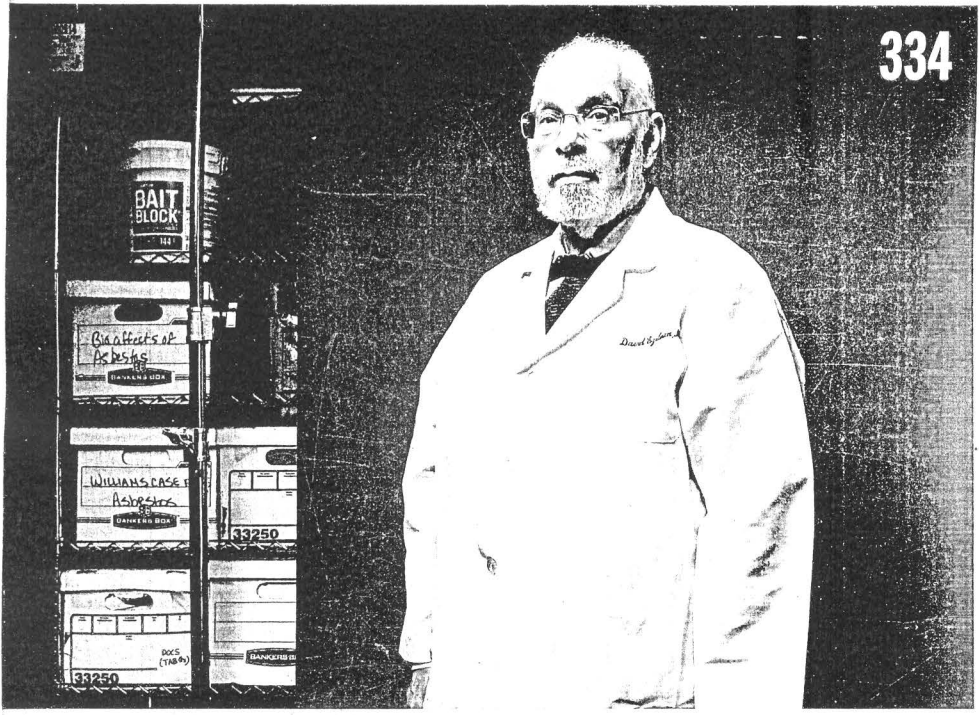
DOB  
13/2/19 ✓ ©

CONTENTS



Art meets shell science

25 JANUARY 2019 • VOLUME 363 • ISSUE 6425



334

INSIGHTS

PERSPECTIVES

336 WHERE TO FIND FANTASTIC BEASTS AT SEA

Why do cold-blooded and warm-blooded marine predators live in different parts of the world? *By N. D. Pyenson*

► RESEARCH ARTICLE P. 366

340 BIOMATERIALS FOR TISSUE REPAIR

Biomaterials can promote endogenous healing without delivering cells or therapeutics *By K. L. Christman*

342 ADVANCES IN WEATHER PREDICTION

Better weather and environmental forecasting will continue to improve well-being *By R. B. Alley et al.*

► REVIEW P. 363

344 TRANSPORT WITH STRONG INTERACTIONS

Motion of spin and charge is explored with cold-atom quantum simulations

*By J.-P. Brantut*

► REPORTS PP. 379 & 383

346 PROCESSED FOODS AND FOOD REWARD

Processed foods compromise the fidelity of gut-brain signaling of food reinforcement

*By D. M. Small and A. G. DiFeliceantonio*

► PODCAST

348 THE MISINFORMATION MACHINE

Misinformation results from many interacting processes *By D. Ruths*

► RESEARCH ARTICLE P. 374

349 RICCARDO GIACCONI (1931–2018)

Pioneer in x-ray astronomy and visionary astrophysicist *By P. Rosati*

POLICY FORUM

350 TOWARD UNRESTRICTED USE OF PUBLIC GENOMIC DATA

Publication interests should not limit access to public data *By R. I. Amann et al.*

BOOKS ET AL.

353 ILLUSTRATING NATURE

Art and science interweave in a tale of two talented sisters and their polymath father *By C. Newman*

NEWS

IN BRIEF

324 News at a glance

IN DEPTH

327 U.S. DEFENSES LOOK TO THWART MISSILES EARLY

Scientists worry about the cost and feasibility of “boost-phase” antimissile technologies

*By G. Popkin*

328 GOVERNMENT REPORT BLASTS CREATOR OF CRISPR TWINS

He Jiankui loses university job after preliminary findings that he “dodged supervision” and violated regulations *By D. Normile*

329 GROWTH OF LEGAL POT FARMS DRIVES SMOG WORRIES

Colorado to launch study of potential air quality effects of indoor cannabis facilities *By J. Plautz*

► PODCAST

330 BOLSONARO'S FIRST MOVES HAVE BRAZILIAN SCIENTISTS WORRIED

Legacy on climate change at risk after government reshuffle *By H. Escobar*

► EDITORIAL P. 323

331 MASSIVE FISH DIE-OFF SPARKS OUTCRY IN AUSTRALIA

“Historic” plan to save the Murray-Darling River Basin failed to prevent ecological disaster *By D. Normile*

332 SCIENTIFIC SOCIETIES WORRY ABOUT THREAT FROM PLAN S

Loss of subscription fees could mean having to cut services or sell journals to commercial publishers *By J. Brainard*

333 LIGHT SKIN MAY BE LEGACY OF NATIVE AMERICAN ANCESTORS

New gene variant undercuts simplistic assumptions about skin color and ancestry in Latin America *By L. Wade*

FEATURES

334 BEARING WITNESS

In the courtroom, physician David Egilman is the scourge of companies he accuses of harming public health and corrupting science *By D. Starr*

PHOTO: KEN RICHARDSON; IMAGE © ANNA MARIE ROOS

**354 WE ARE THE (COMMUNICATION) CHAMPIONS**

Emotional intelligence and other "soft skills" are key to convincing science stakeholders *By P. R. Reczek*

**LETTERS****355 DEFENDING HARASSERS HARMS VICTIMS**

*By S. Barolo et al.*

**355 EDITOR'S NOTE**

*By J. Berg*

**356 TUBERCULOSIS THREAT IN ASIAN ELEPHANTS**

*By S. Paudel et al.*

**356 #GREXIT'S UNINTENDED CONSEQUENCES**

*By Z. Faulkes*

**RESEARCH****IN BRIEF**

**360** From *Science* and other journals

**REVIEW****363 TOMORROW'S EARTH**

Ocean recoveries for tomorrow's Earth: Hitting a moving target *K. E. Ingeman et al.*

REVIEW SUMMARY; FOR FULL TEXT:

[dx.doi.org/10.1126/science.aav1004](https://doi.org/10.1126/science.aav1004)

► PERSPECTIVE P. 342

**RESEARCH ARTICLES****364 HUMAN GENETICS**

Characterizing mutagenic effects of recombination through a sequence-level genetic map *B. V. Halldorsson et al.*

RESEARCH ARTICLE SUMMARY; FOR FULL TEXT:

[dx.doi.org/10.1126/science.aau1043](https://doi.org/10.1126/science.aau1043)

**365 NEUROIMMUNOLOGY**

Single-cell profiling identifies myeloid cell subsets with distinct fates during neuroinflammation *M. J. C. Jordão et al.*

RESEARCH ARTICLE SUMMARY; FOR FULL TEXT:

[dx.doi.org/10.1126/science.aat7554](https://doi.org/10.1126/science.aat7554)

**366 BIODIVERSITY PATTERNS**

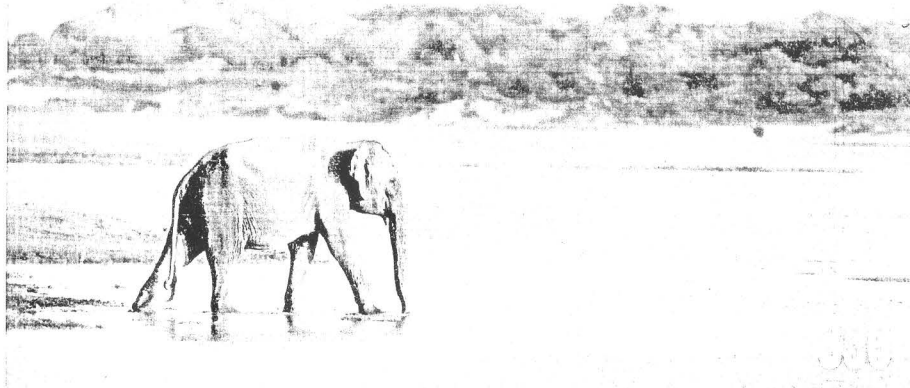
Metabolic asymmetry and the global diversity of marine predators

*J. M. Grady et al.*

RESEARCH ARTICLE SUMMARY; FOR FULL TEXT:

[dx.doi.org/10.1126/science.aat4220](https://doi.org/10.1126/science.aat4220)

► PERSPECTIVE P. 338

**367 VOLCANOLOGY**

The 2018 rift eruption and summit collapse of Kilauea Volcano *C. A. Neal et al.*

**374 POLITICAL SCIENCE**

Fake news on Twitter during the 2016 U.S. presidential election *N. Grinberg et al.*

► PERSPECTIVE P. 348

**REPORTS****379 QUANTUM SIMULATION**

Bad metallic transport in a cold atom Fermi-Hubbard system

*P. T. Brown et al.*

**383** Spin transport in a Mott insulator of ultracold fermions *M. A. Nichols et al.*

► PERSPECTIVE P. 344

**387 NANOPOROUS MATERIALS**

Design and control of gas diffusion process in a nanoporous soft crystal *C. Gu et al.*

**391 ORGANIC CHEMISTRY**

*E*-Olefins through intramolecular radical relocation *A. Kapat et al.*

**396 SOLID-STATE CHEMISTRY**

A hydrated crystalline calcium carbonate phase: Calcium carbonate hemihydrate *Z. Zou et al.*

**400 ORGANIC CHEMISTRY**

An enantioconvergent halogenophilic nucleophilic substitution ( $S_N2X$ ) reaction *X. Zhang et al.*

**405 ORGANIC CHEMISTRY**

Pharmaceutical diversification via palladium oxidative addition complexes *M. R. Uehling et al.*

**409 PLANT SCIENCE**

A regulatory circuit conferring varied flowering response to cold in annual and perennial plants *Y. Hyun et al.*

**413 NEURODEVELOPMENT**

Distinct molecular programs regulate synapse specificity in cortical inhibitory circuits *E. Favuzzi et al.*

**DEPARTMENTS****323 EDITORIAL**

Working together for Amazonia *By Paulo Artaxo*

► NEWS STORY P. 330

**422 WORKING LIFE**

From competition to collaboration *By Giovanni Camanni*

**ON THE COVER**

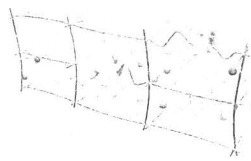
Lava erupts from fissure 8 on 10 June 2018 in the lower East Rift Zone of Kilauea Volcano, Hawai'i. The erupting lava formed a channel and flowed toward the ocean at Kapoho, Hawai'i.

Meanwhile, the summit caldera is collapsing. The vigorous rift zone eruption and summit collapse lasted about 3 months. See page 367. *Photo: L.E. Baskow/ZUMA Wire/Alamy Live News*

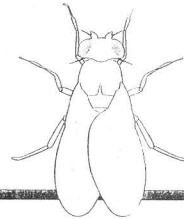
Science Staff.....	322
AAAS News & Notes.....	357
New Products.....	418
Science Careers.....	419

SCIENCE (ISSN 0036-8075) is published weekly on Friday, except last week in December, by the American Association for the Advancement of Science, 1200 New York Avenue, NW, Washington, DC 20005. Periodicals mail postage (publication No. 484460) paid at Washington, DC, and additional mailing offices. Copyright © 2019 by the American Association for the Advancement of Science. The title SCIENCE is a registered trademark of the AAAS. Domestic individual membership, including subscription (12 months): \$165 (\$74 allocated to subscription). Domestic institutional subscription (51 issues): \$1971; Foreign postage extra: Mexico, Caribbean (surface mail) \$55; other countries (air assist delivery) \$98. First class, airmail, student, and emeritus rates on request. Canadian rates with GST available upon request. GST #125488122. Publications Mail Agreement Number 1069624. Printed in the U.S.A. Change of address: Allow 4 weeks, giving old and new addresses and 8-digit account number. Postmaster: Send change of address to AAAS, P.O. Box 96178, Washington, DC 20090-6178. Single-copy sales: \$15 each plus shipping and handling; bulk rate on request. Authorization to reproduce material for internal or personal use under circumstances not falling within the fair use provisions of the Copyright Act can be obtained through the Copyright Clearance Center (CCC), www.copyright.com. The identification code for Science is 0036-8075. Science is indexed in the Reader's Guide to Periodical Literature and in several specialized indexes.





Artificial strength training



Why does infection make us sleep?

455 LINKING IMMUNITY AND SICKNESS-INDUCED SLEEP

An antimicrobial peptide induces sleep after sleep deprivation or infection

By G. Oikonomou and D. A. Prober

RESEARCH ARTICLE PAGE 455

458 TAKING A CLOSE LOOK AT OCEAN CIRCULATION

Ocean circulation patterns in the North Atlantic provide a benchmark for climate models

By M. Rhein

RESEARCH ARTICLE PAGE 458

457 EXPANDING THE ANTI-TB ARSENAL

A new tuberculosis drug target reveals an additional antimicrobial resistance mechanism

By V. Mizrahi and D. F. Warner

RESEARCH ARTICLE PAGE 457



POLICY FORUM

SHADOW HEALTH RECORDS MEET NEW DATA PRIVACY LAWS

How will research respond to a changing regulatory space?

By W. N. Price II et al.

BOOKS ET AL.

THE SHAKY SCIENCE OF RECOVERY

Holistic workout recovery regimes often outperform touted tech, finds a writer who tried them all

By C. James

LESSONS FROM THE LITTLE ICE AGE

Citing 17th-century culture shifts, an author implicates climate in human destiny

By M. E. Hannibal

LETTERS

PLAN S: UNREALISTIC CAPPED FEE STRUCTURE

By A. J. Kowaltowski and M. F. Oliveira

PLAN S: OVERLOOKED HYBRID JOURNAL MODEL

By I. Shrier and C. Schmid

PLAN S: A THREAT TO QUALITY OF SCIENCE?

By M. Spedding et al.

PLAN S: MOTIVATIONS OF FOR-PROFIT PUBLISHERS

By T. D. Eddy

RESEARCH

IN BRIEF

From Science and other journals

RESEARCH ARTICLES

MEMBRANE PROTEINS

Rhomboid distorts lipids to break the viscosity-imposed speed limit of membrane diffusion

A. J. B. Kreutzberger et al.

RESEARCH ARTICLE SUMMARY; FULL TEXT; OR ORIGINAL PUBLICATION SOURCE; PAPERBACK PRICE

TUBERCULOSIS

Opposing reactions in coenzyme A metabolism sensitize Mycobacterium tuberculosis to enzyme inhibition

E. Ballinger et al.

RESEARCH ARTICLE SUMMARY; FULL TEXT; OR ORIGINAL PUBLICATION SOURCE; PAPERBACK PRICE

GENETIC EVOLUTION

Linking a mutation to survival in wild mice

R. D. H. Barrett et al.

POLYMERS

Mechanoresponsive self-growing hydrogels inspired by muscle training

T. Matsuda et al.

PHYSIOLOGY

A sleep-inducing gene, nemuri, links sleep and immune function in Drosophila

H. Toda et al.

RESEARCH ARTICLE SUMMARY; FULL TEXT; OR ORIGINAL PUBLICATION SOURCE; PAPERBACK PRICE

OCEAN CIRCULATION

A sea change in our view of overturning in the subpolar North Atlantic

M. S. Lozier et al.

RESEARCH ARTICLE PAGE 458

REPORTS

ATOMIC PHYSICS

Correlations in high-harmonic generation of matter-wave jets revealed by pattern recognition

L. Feng et al.

ELECTRON MICROSCOPY

Identification of site-specific isotopic labels by vibrational spectroscopy in the electron microscope

J. A. Hachtel et al.

QUANTUM IMAGING

Quantum reference beacon-guided superresolution optical focusing in complex media

D. Kim and D. R. Englund

BLACK HOLE PHYSICS

A loud quasi-periodic oscillation after a star is disrupted by a massive black hole

D. R. Pasham et al.

MARTIAN GEOLOGY

A surface gravity traverse on Mars indicates low bedrock density at Gale crater

K. W. Lewis et al.

RESEARCH ARTICLE PAGE 457

NEUROSCIENCE

Intense threat switches dorsal raphe serotonin neurons to a paradoxical operational mode

C. Seo et al.

DEPARTMENTS

EDITORIAL

Democracy's plight

By Rush Holt

WORKING LIFE

Crafting social ties

By Carolyn Trietsch

Science Staff.....432
New Products.....543
Science Careers.....544

SCIENCE (ISSN 0036-8075) is published weekly on Friday, except last week in December, by the American Association for the Advancement of Science, 1200 New York Avenue, NW, Washington, DC 20005. Periodicals mail postage (publication No. 484460) paid at Washington, DC, and additional mailing offices. Copyright © 2019 by the American Association for the Advancement of Science. The title SCIENCE is a registered trademark of the AAAS. Domestic individual membership, including subscription (12 months): \$165 (\$74 allocated to subscription). Domestic institutional subscription (51 issues): \$1971; Foreign postage extra: Mexico, Caribbean (surface mail) \$55; other countries (air assist delivery) \$98. First class, airmail, student, and emeritus rates on request. Canadian rates with GST available upon request, GST #125488122. Publications Mail Agreement Number 1069624. Printed in the U.S.A. Change of address: Allow 4 weeks, giving old and new addresses and 8-digit account number. Postmaster: Send change of address to AAAS, P.O. Box 96178, Washington, DC 20090-6178. Single-copy sales: \$15 each plus shipping and handling; bulk rate on request. Authorization to reproduce material for internal or personal use under circumstances not falling within the fair use provisions of the Copyright Act can be obtained through the Copyright Clearance Center (CCC), www.copyright.com. The identification code for Science is 0036-8075. Science is indexed in the Reader's Guide to Periodical Literature and in several specialized indexes.

CREDITS FROM TOP LEFT: © BICKEL/SCIENCE; A. KITTERMAN/SCIENCE; DAVIDE BONAZZI/SALZMANART

# CONTENTS

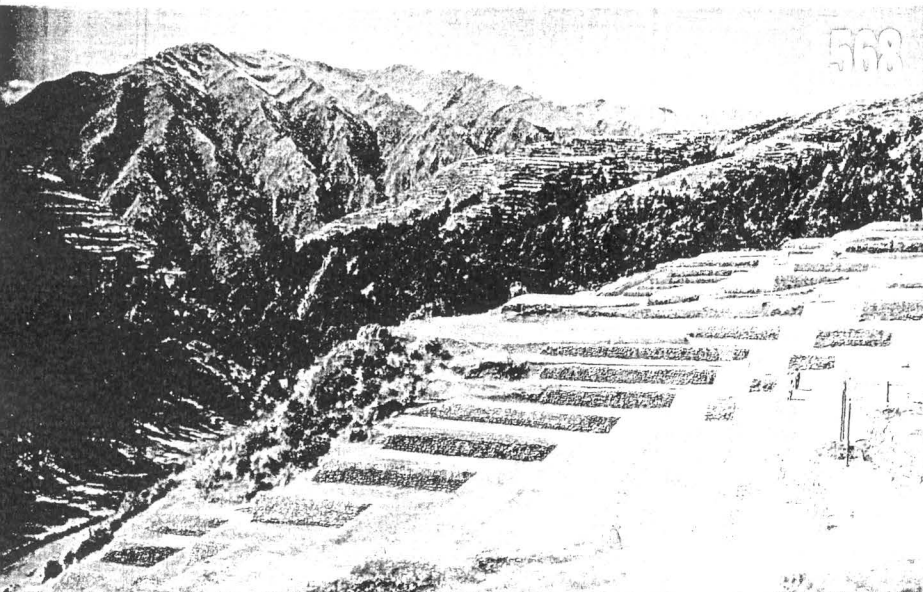
103  
6/13/2019



662

Finding your pace

8 FEBRUARY 2019 • VOLUME 363 • ISSUE 6427



568

Incan terraces in the Sacred Valley of Peru, which has become a major tourist destination

## NEWS

### IN BRIEF

564 News at a glance

### IN DEPTH

#### 568 AIRPORT CONSTRUCTION THREATENS INCAN HEARTLAND

Nearly 200 researchers sign letter opposing project, saying it could harm ancient sites *By L. Wade*

#### 569 GUT BACTERIA LINKED TO MENTAL WELL-BEING AND DEPRESSION

Microbial biochemistry may affect nerve cell function *By E. Pennisi*

#### 570 INDONESIA EARTHQUAKE BROKE A GEOLOGIC SPEED LIMIT

Event could raise hazard risks by showing "supershear" earthquakes can strike more faults *By P. Voosen*

#### 571 PILLS GIVE PATIENTS A SHOT INSIDE THE STOMACH

Capsules that internally inject insulin and other medicines could do away with daily jabs *By R. F. Service*

▶ REPORT P. 611; PODCAST

#### 572 SPACE MAGNET HOMES IN ON DARK MATTER CLUE

But aging cosmic ray experiment may never explain the mystery of extra antimatter *By A. Cho*

#### 573 VIRTUAL COPY OF RANSACKED MUSEUM COMES TO MOSUL

Crowdsourced images allow partial reconstruction of treasures destroyed by the Islamic State group *By A. Curry*

### FEATURE

#### 574 THE NEW POTATO

Breeders seek a breakthrough to help farmers facing an uncertain future *By E. Stokstad*

▶ PODCAST



## INSIGHTS

### PERSPECTIVES

#### 578 NITROGEN IN THE ENVIRONMENT

Excess nitrogen causes problems in developed nations, but nitrogen-poor soils threaten food security elsewhere *By C. J. Stevens*

▶ REVIEW P. 597

#### 580 HOW DO AEROSOLS AFFECT CLOUDINESS?

Cloud-aerosol interactions can be determined more accurately by isolating aerosol effects *By Y. Sato and K. Suzuki*

▶ RESEARCH ARTICLE P. 599

#### 582 BRANCHED-CHAIN AMINO ACIDS IN DISEASE

Are BCAAs a biomarker, causal agent, or both in cardiometabolic disease?

*By P. J. White and C. B. Newgard*

#### 584 A SWEETER APPROACH TO VACCINE DESIGN

Glycoengineering may improve next-generation vaccines and immunotherapies *By J. T. Wilson*

▶ REPORT P. 649

#### 585 SLOWING BLOOD FLOW TO FIGHT VIRAL INFECTION

T cells produce acetylcholine to dilate blood vessels and migrate into infected tissues *By H. D. Hickman*

▶ REPORT P. 639

#### 586 SINGLE-MODE LASING BY SELECTIVE MODE PAIRING

High-order laser modes are suppressed by pairing them with lossy "superpartners" *By T. Kottos*

▶ REPORT P. 623

### POLICY FORUM

#### 588 GOVERNMENT DATA, COMMERCIAL CLOUD: WILL PUBLIC ACCESS SUFFER?

New data handling models may affect use for research *By M. Borowitz*

### BOOKS ET AL.

#### 590 THE END OF EVOLUTION?

A biochemist's crusade to overturn evolution misrepresents theory and ignores evidence *By N. H. Lents et al.*

591 LIQUID LESSONS

From ink to oceans, a materials scientist explores the properties of fluids encountered on a transatlantic flight  
By S. Brandt

LETTERS

592 BRAZIL'S INDIGENOUS LANDS UNDER THREAT

By R. Anzolin Begotti and C. A. Peres

593 A DYNAMIC STRATEGY FOR EU CONSERVATION

By V. Hermoso et al.

593 PUTTING INVERTEBRATE LACTATION IN CONTEXT

By J. B. Benoit et al.

593 TECHNICAL COMMENT ABSTRACTS

593 ERRATA

RESEARCH

IN BRIEF

594 From *Science* and other journals

REVIEW

597 GREENHOUSE GASES

Strengthened scientific support for the Endangerment Finding for atmospheric greenhouse gases  
P. B. Duffy et al.

REVIEW SUMMARY; FOR FULL TEXT:

dx.doi.org/10.1126/science.aat5982

► PERSPECTIVE P. 578

RESEARCH ARTICLES

598 PHOTOSYNTHESIS

Structural basis for blue-green light harvesting and energy dissipation in diatoms  
W. Wang et al.

RESEARCH ARTICLE SUMMARY; FOR FULL TEXT:

dx.doi.org/10.1126/science.aav0365

599 CLIMATE

Aerosol-driven droplet concentrations dominate coverage and water of oceanic low-level clouds

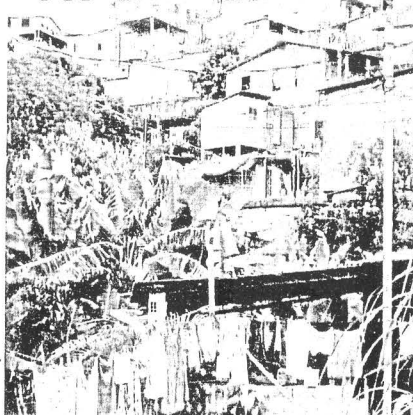
D. Rosenfeld et al.

RESEARCH ARTICLE SUMMARY; FOR FULL TEXT:

dx.doi.org/10.1126/science.aav0566

► PERSPECTIVE P. 580

607



A long-term study monitored the infection dynamics of Zika virus within a Brazilian slum community.

600 DRUG METABOLISM

Separating host and microbiome contributions to drug pharmacokinetics and toxicity  
M. Zimmermann et al.

RESEARCH ARTICLE SUMMARY; FOR FULL TEXT:

dx.doi.org/10.1126/science.aat19931

601 INORGANIC CHEMISTRY

Eliminating nonradiative decay in Cu(I) emitters: >99% quantum efficiency and microsecond lifetime  
R. Hamze et al.

607 EPIDEMIOLOGY

Impact of preexisting dengue immunity on Zika virus emergence in a dengue endemic region

I. Rodriguez-Barraquer et al.

REPORTS

611 BIOMEDICINE

An ingestible self-orienting system for oral delivery of macromolecules  
A. Abramson et al.

► NEWS STORY P. 571

615 CHEMISTRY

Tilting a ground-state reactivity landscape by vibrational strong coupling  
A. Thomas et al.

619 TEXTILES

Dynamic gating of infrared radiation in a textile  
X. A. Zhang et al.

623 LASERS

Supersymmetric laser arrays  
M. P. Hokmabadi et al.

► PERSPECTIVE P. 536

627 SOLAR CELLS

Homogenized halides and alkali cation segregation in alloyed organic-inorganic perovskites  
J.-P. Correa-Baena et al.

631 CLIMATE RESPONSES

Life history responses of meerkats to seasonal changes in extreme environments  
M. Paniw et al.

635 NEUROSCIENCE

Schema cells in the macaque hippocampus  
P. Baraduc et al.

639 NEUROIMMUNOLOGY

Choline acetyltransferase-expressing T cells are required to control chronic viral infection  
M. A. Cox et al.

► PERSPECTIVE P. 585

644 CANCER

Tumor metastasis to lymph nodes requires YAP-dependent metabolic adaptation  
C.-k. Lee et al.

649 HIV VACCINES

Innate immune recognition of glycans targets HIV nanoparticle immunogens to germinal centers  
T. Tokatlian et al.

► PERSPECTIVE P. 584

DEPARTMENTS

563 EDITORIAL

Transcending boundaries  
By Margaret Hamburg

662 WORKING LIFE

When the trail gets steep  
By Leela Dilkes-Hoffman

ON THE COVER



For thousands of years, Andean farmers have cultivated colorful landraces of domesticated potatoes, such as lioness, tunica, and tarmeña shown in this arrangement. Landraces and wild

species hold genetic diversity that could be key to developing new potato varieties, which are needed to help farmers adapt to climate change and other challenges. See page 574. Photo: Gustavo Ramirez

Science Staff .....562  
New Products.....655  
Science Careers ..... 656

SCIENCE (ISSN 0036-8075) is published weekly on Friday, except last week in December, by the American Association for the Advancement of Science, 1200 New York Avenue, NW, Washington, DC 20005. Periodicals mail postage (publication No. 484460) paid at Washington, DC, and additional mailing offices. Copyright © 2019 by the American Association for the Advancement of Science. The title SCIENCE is a registered trademark of the AAAS. Domestic individual membership, including subscription (12 months): \$165 (\$74 allocated to subscription). Domestic institutional subscription (51 issues): \$1971. Foreign postage extra: Mexico, Caribbean (surface mail) \$55; other countries (air assist delivery): \$98. First class, airmail, student, and emeritus rates on request. Canadian rates with GST available upon request. GST #125488122. Publications Mail Agreement Number 1069624. Printed in the U.S.A. Change of address: Allow 4 weeks, giving old and new addresses and 8-digit account number. Postmaster: Send change of address to AAAS, P.O. Box 96178, Washington, DC 20090-6178. Single-copy sales: \$15 each plus shipping and handling; bulk rate on request. Authorization to reproduce material for internal or personal use under circumstances not falling within the fair use provisions of the Copyright Act can be obtained through the Copyright Clearance Center (CCC), www.copyright.com. The identification code for Science is 0036-8075. Science is indexed in the Reader's Guide to Periodical Literature and in several specialized indexes.

106



ARTICLES/SHORT FEATURES

**Methanol and DME Economy in India** .....Pg 19  
Anand Ghosalkar & Pramod Kumbhar

**High Ash Indian Coals: Gasification Strategy** .....Pg 24  
Prakash D. Chavan

**Producing Alternative Fuels from Renewable Sources** .....Pg 28  
Sudip Maity

**Biofuels Quiz** .....Pg 30  
Kirti Chhabra and Shivani

**Happy Birthday Helium!** .....Pg 34  
Aparna Krishnamurthy

**Technology Delivery to Empower Women** .....Pg 36  
Indu Puri

**Diet, Desiccation, Dialogue: Trehalose for Tolerance** .....Pg 40  
K.P. Madhu

Report

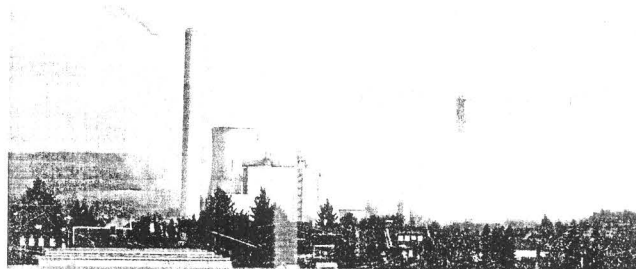
**Celebrating the Decennial Year of "India Nano"** .....Pg 46  
Wafia Masih

COVER STORY

**Methanol and DME - Alternative Fuels for a More Self-Reliant India**

Anjan Ray

Pg 14



*In view of urban air quality issues, climate change considerations and economic consequences of dependence on fossil fuel imports, the possibilities for incorporating carbon based fuels such as methanol and dimethyl ether into the alternative energy basket of the country, or potentially rapid adoption need to be explored.*

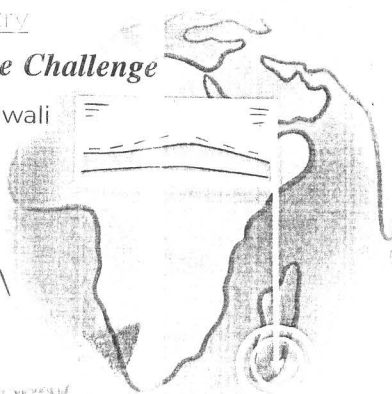
Science Fiction - Seventh

Pg 48

Best Entry

**The Core Challenge**

Pravin Gawali



13/2/19  
13/2/19

DEPARTMENTS

REACTIONS ..... 8

EDITORIAL ..... 9

SPECTRUM ..... 10

READERSHIP SURVEY ..... 51

PUZZLE CORNER ..... 52

NATURE'S MARVELS ..... 54

WHAT'S NEW ..... 56

INNOVATIVE MINDS ..... 58

CURIOSITY CORNER ..... 60

TEST YOUR KNOWLEDGE ..... 62

CROSSWORD ..... 64

107

Jan 11/2019  
24 87 7 0000  
17-00-00-00 0000  
010 010 00 00 00  
1 0000-15

JANUARY 2019

VOLUME 320, NUMBER 1

# SCIENTIFIC AMERICAN



**20 Evolved to Exercise**  
Why humans must stay active to be healthy. *By Herman Pontzer*

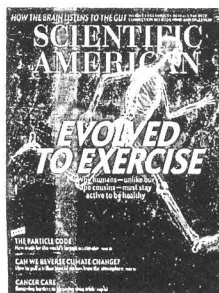
**28 The Particle Code**  
Scientists are creating mathematical tools to identify novel particles and phenomena at the world's largest particle accelerator. *By Matthew von Hippel*

**34 The Social Lives of the Amboseli Baboons**  
Strong relationships seem to help baboons overcome early life adversity, and that could have big implications for human health. *By Lydia Denworth*

**44 Mind over Meal**  
Weight-loss surgery reveals a deep and surprising connection between the gut and the brain. *By Bret Stetka*

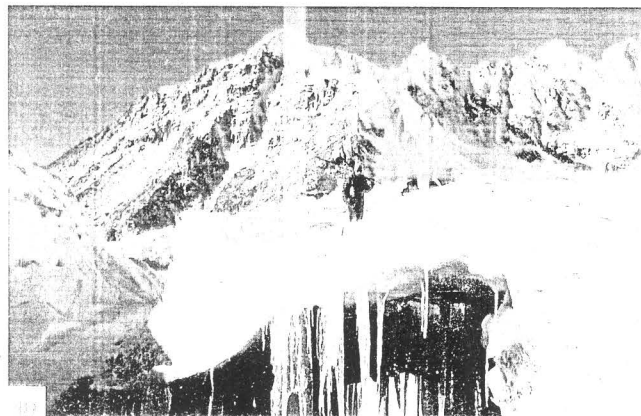
**50 The Last Resort**  
Can we remove enough CO<sub>2</sub> from the atmosphere to slow or even reverse climate change? *By Richard Conniff*

**58 Out of Reach**  
Most cancer patients never get into potentially lifesaving drug trials because of barriers at community hospitals. *By David H. Freedman*



**ON THE COVER**  
Humans have evolved to be far more active than our closest living relatives, the great apes. Our bodies need a good deal of exercise to function normally because unlike the plant-eating apes, humans had to adapt to a physically demanding hunting-and-gathering way of life. Illustration by Bryan Christie.

# SCIENTIFIC AMERICAN



### 3 From the Editor

### 4 Letters

### 6 Science Agenda

Time to get arsenic out of baby food. *By the Editors*

### 7 Forum

Diversity brings a wealth of perspectives to research. *By Elijah Lowenstein*

### 8 Advances

A new way to read the body's clock. Why lawns are not sustainable. The gene that helped humans run long distances. An app for remembering faces.

### 16 The Science of Health

How a woman's heart differs from a man's in sickness and health. *By Claudia Wallis*

### 17 TechnoFiles

Parting lessons about technology. *By David Pogue*

### 64 Recommended

The art of science and engineering. On the trail of the elusive quasicrystal. False beliefs and the spread of misinformation. *By Andrea Gawrylewski*

### 65 Skeptic

What do most conscious beings want? A case for scientific humanism. *By Michael Shermer*

### 66 Anti Gravity

Caring for the Tower of London's resident ravens is a full-time job. *By Steve Mirsky*

### 67 50, 100 & 150 Years Ago

### 68 Graphic Science

Take your medicine when the time is right. *By Mark Fischetti and Martin Krzywinski*

#### ON THE WEB

### A Space-Based Building Boom?

*Scientific American* reports on new efforts from NASA and other federal agencies seeking to service and assemble large structures—such as life-finding telescopes—in space. Go to [www.ScientificAmerican.com/jan2019/space-based](http://www.ScientificAmerican.com/jan2019/space-based)

Scientific American (ISSN 0036-8733), Volume 320, Number 1, January 2019, published monthly by Scientific American, a division of Springer Nature America, Inc., 1 New York Plaza, Suite 4500, New York, N.Y. 10004-1562. Periodicals postage paid at New York, N.Y., and at additional mailing offices. Canada Post International Publications Mail (Canadian Distribution) Sales Agreement No. 40012504. Canadian BN No. 127387652RT; TVQ1218059275 TQ0001. Publication Mail Agreement #40012504. Return undeliverable mail to Scientific American, P.O. Box 819, Stn Main, Markham, ON L3P 8A2. Individual Subscription rates: 1 year \$49.99 (USD), Canada \$59.99 (USD), International \$69.99 (USD). Institutional Subscription rates: Schools and Public Libraries: 1 year \$84 (USD), Canada \$89 (USD), International \$96 (USD). Businesses and Colleges/Universities: 1 year \$399 (USD), Canada \$405 (USD), International \$411 (USD). Postmaster: Send address changes to Scientific American, Box 3187, Harlan, Iowa 51537. Reprints inquiries: (212) 451-8415. To request single copies or back issues, call (800) 333-1199. Subscription inquiries: U.S. and Canada (800) 333-1199; other (515) 248-7684. Send e-mail to [scacustserv@cdsfulfillment.com](mailto:scacustserv@cdsfulfillment.com). Printed in U.S.A. Copyright © 2018 by Scientific American, a division of Springer Nature America, Inc. All rights reserved.



EVGENYA A. PODOLSKY (middle)

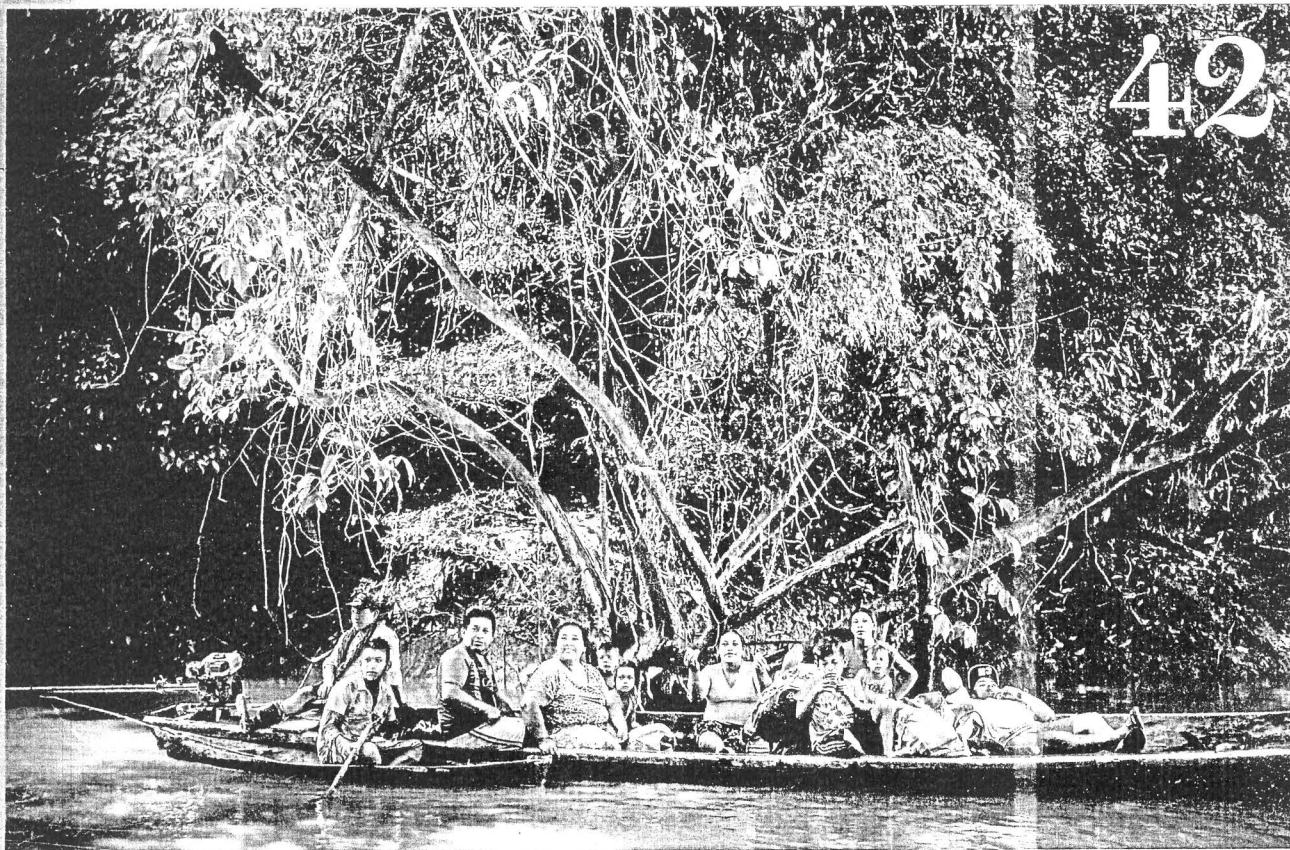
Scientific American is part of Springer Nature, which owns or has commercial relations with thousands of scientific publications (many of them can be found at [www.springernature.com/us](http://www.springernature.com/us)). Scientific American maintains a strict policy of editorial independence in reporting developments in science to our readers. Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

109

FEBRUARY 2019

VOLUME 320, NUMBER 2

# SCIENTIFIC AMERICAN



## 18 Face Values

Researchers have isolated the brain regions that process faces and cracked the code for recognizing them.

By Doris Y. Tsao

## 26 Ghost Flowers

The genes of Hawaiian plants, extinct for more than a century, have been brought back from the dead. Today we can smell their scents.

By Rowan Jacobsen

## 36 Is Antarctica Collapsing?

Rapid glacier retreat could put coastlines underwater sooner than anticipated.

By Richard B. Alley

## 42 Guardians of the Tiger People

As anthropologists debate how best to protect uncontacted tribes, indigenous groups in Colombia are working to shield their isolated neighbors from the march of modernity.

By Adam Piore

## 52 The Exoplanet Next Door

What Venus can teach us about planets far beyond our own solar system.

By M. Darby Dyar, Suzanne E. Smrekar and Stephen R. Kane

## 60 Re-engineering the Colorado River

Can dam releases that mimic natural flows restore the Grand Canyon ecosystem?

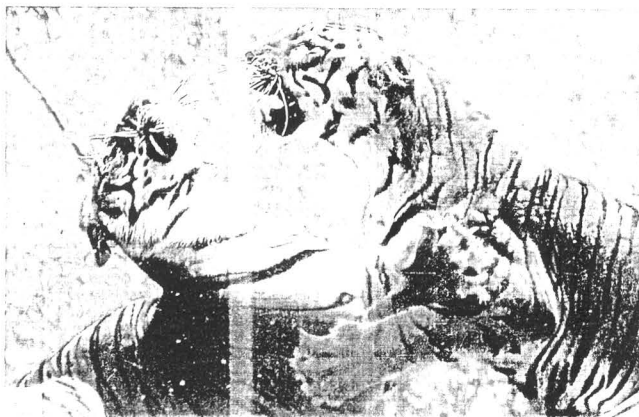
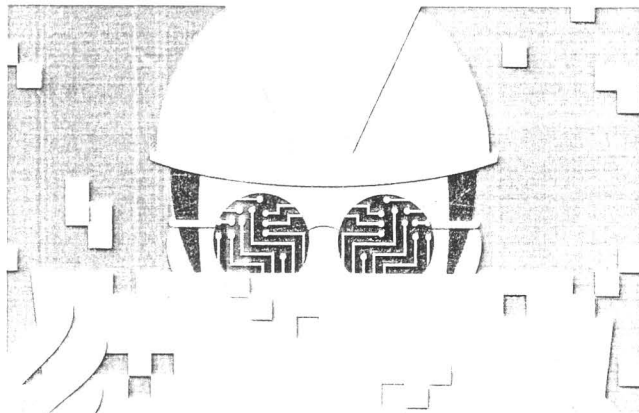
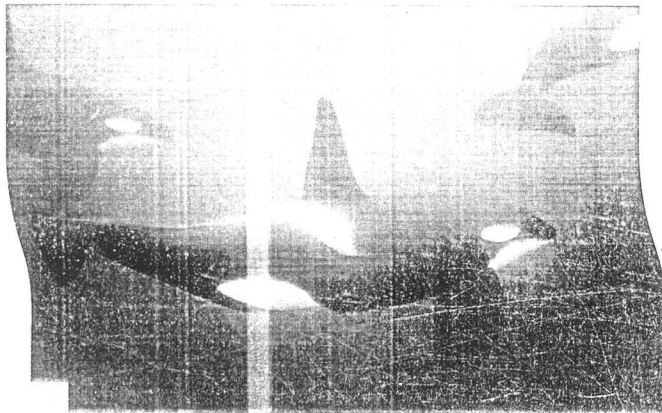
By Heather Hansman



### ON THE COVER

Scientists have taken major steps toward understanding how the brain recognizes faces—one of the great challenges of neuroscience. Not only have they found sections of the cerebral cortex that perform this function, they have also decoded the computations that enable the brain to distinguish any given face. Illustration by Maciej Frolow.

# SCIENTIFIC AMERICAN



### 3 From the Editor

### 4 Letters

### 6 Science Agenda

Embrace midwifery for better maternity care and birth outcomes in the U.S. *By the Editors*

### 7 Forum

Better biomarkers could help speed the diagnosis and treatment of Alzheimer's. *By Howard M. Fillit*

### 8 Advances

Whales and chimpanzees have similar personality traits. Fooling urine tests. A camera inspired by shrimp. The science of bird jumping. Cosmic origin of sand.

### 16 The Science of Health

Virtual reality promises to transform patient care. *By Claudia Wallis*

### 17 Ventures

Venture capital isn't needed for a thriving local economy. *By Wade Rouse*

### 68 Recommended

Legendary man-eating tiger of Champawat. How the world went digital. Is exercise recovery wishful thinking? Lessons of the Little Ice Age. *By Andrea Gawrylewski*

### 69 The Intersection

Is the Internet of Things our friend? *By Zeynep Tufekci*

### 70 Anti Gravity

Producing, harvesting, identifying and recycling feces. *By Steve Mirsky*

### 71 50, 100 & 150 Years Ago

### 72 Graphic Science

The hazards of space junk. *By Mark Fischetti and Jan Willem Tulp*

#### ON THE WEB

### Climate Domino Effect

Catastrophes such as floods can set off a cascade of damage to everything from power grids to health systems. *Scientific American* details efforts to predict these complex impacts. Go to [www.ScientificAmerican.com/feb2019/consequences](http://www.ScientificAmerican.com/feb2019/consequences)

Scientific American (ISSN 0036-8733), Volume 320, Number 2, February 2019, published monthly by Scientific American, a division of Springer Nature America, Inc., 1 New York Plaza, Suite 4600, New York, N.Y. 10004-1562. Periodicals postage paid at New York, N.Y., and at additional mailing offices. Canada Post International Publications Mail (Canadian Distribution) Sales Agreement No. 40012504. Canadian BN No. 127387652RT; TVQ121805975 TQ0001. Publication Mail Agreement #40012504. Return undeliverable mail to Scientific American, P.O. Box 819, Stn Main, Markham, ON L3P 8A2. Individual Subscription rates: 1 year \$49.99 (USD), Canada \$59.99 (USD), International \$69.99 (USD). Institutional Subscription rates: Schools and Public Libraries: 1 year \$84 (USD), Canada \$89 (USD), International \$96 (USD). Businesses and Colleges/Universities: 1 year \$399 (USD), Canada \$405 (USD), International \$411 (USD). Postmaster: Send address changes to Scientific American, Box 3187, Harlan, Iowa 51537. Reprints inquiries: (212) 451-8415. To request single copies or back issues, call (800) 333-1199. Subscription inquiries: U.S. and Canada (800) 333-1199; other (515) 248-7684. Send e-mail to [scacustserv@cdsfulfillment.com](mailto:scacustserv@cdsfulfillment.com). Printed in U.S.A. Copyright © 2019 by Scientific American, a division of Springer Nature America, Inc. All rights reserved.

Scientific American is part of Springer Nature, which owns or has commercial relations with thousands of scientific publications (many of them can be found at [www.springernature.com/us](http://www.springernature.com/us)). Scientific American maintains a strict policy of editorial independence in reporting developments in science to our readers. Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

(111)

# 713

## INDIA 2018

a symposium on

the year that was

### symposium participants

*Seminars*

*Jan 2019*

26	<b>ASSESSING ACHHE DIN</b> T.N. Ninan, Chairman, Business Standard Private Limited, Delhi
34	<b>RESOLVING A CRISIS</b> Mihir S. Sharma, Senior Fellow, Observer Research Foundation, Delhi
38	<b>TIME FOR AN ASSURED FARM INCOME</b> Devinder Sharma, specialist in food and agriculture, Chandigarh
42	<b>FARMER DISTRESS: MISSING THE MACROECONOMIC FACTOR</b> Pronab Sen, Country Director, International Growth Centre; formerly Principal Economic Advisor, Planning Commission, Delhi
47	<b>WHERE IS THE NEW POLITICS?</b> Sahas Palshikar, Director of Lokniti-CSDS, Pune
52	<b>POLITICAL FINANCE IN INDIA: DÉJÀ VU ALL OVER AGAIN</b> Milan Vaishnav, Director and Senior Fellow, South Asia Programme, Carnegie Endowment for International Peace, Washington, D.C.
56	<b>KASHMIR: EVERYDAYNESS BETWEEN BUKHARI AND WANI</b> The Kashmir Collective, a group of researchers on Kashmir
61	<b>THE DRAVIDIAN CONSENSUS</b> V. Geetha, historian and freelance editor, Chennai
65	<b>THE GREAT KERALA FLOODS 2018</b> K.P. Kannan, Honorary Fellow, Centre for Development Studies; Chairman, Laurie Baker Centre for Habitat Studies, Thiruvananthapuram
70	<b>CITIZENSHIP</b> Hamid Ansari, former Vice President of India
74	<b>DIPLOMATIC RETRENCHMENT</b> Kanti Bajpai, Wilmar Professor of Asian Studies and Director, Centre on Asia and Globalization, Lee Kuan Yew School of Public Policy, National University of Singapore
79	<b>ENGAGING TRUMP'S AMERICA</b> Srinath Raghavan, Professor of International Relations and History, Ashoka University, Sonapat
83	<b>RETURNING TO THE ANDAMAN SEA</b> C. Raja Mohan, Director and Ankush Ajay Wagle, Research Analyst, Institute of South Asian Studies, National University of Singapore
87	<b>SOLUTIONS WHEN THE 'SOLUTION' IS THE PROBLEM</b> Yamini Aiyar, President, Centre for Policy Research, Delhi
91	<b>REFORMING THE REFORM PROCESS</b> Nitin Desai, former Chief Economic Adviser, Ministry of Finance, GoI
95	<b>RSS: FACT AND FICTION</b> Chanakya
100	<b>THE CHALLENGE FOR CIVIL SOCIETY</b> Vijay Mahajan, CEO, Rajiv Gandhi Foundation, Delhi
104	<b>THE LGBTQ MOVEMENT IN INDIA</b> Devdutt Pattanaik, author, speaker, illustrator and mythologist, Mumbai
108	<b>SEEING THE POOR: UNPACKING THE SUPREME COURT ON AADHAAR</b> Ria Singh Sawhney, Attorney, Delhi
113	<b>BACKPAGE</b>
114	<b>INDEX</b>
	<b>COVER</b> Designed by <a href="http://www.designosis.in">www.designosis.in</a>

# 714

## MANDATE FOR HEALTH

a symposium on

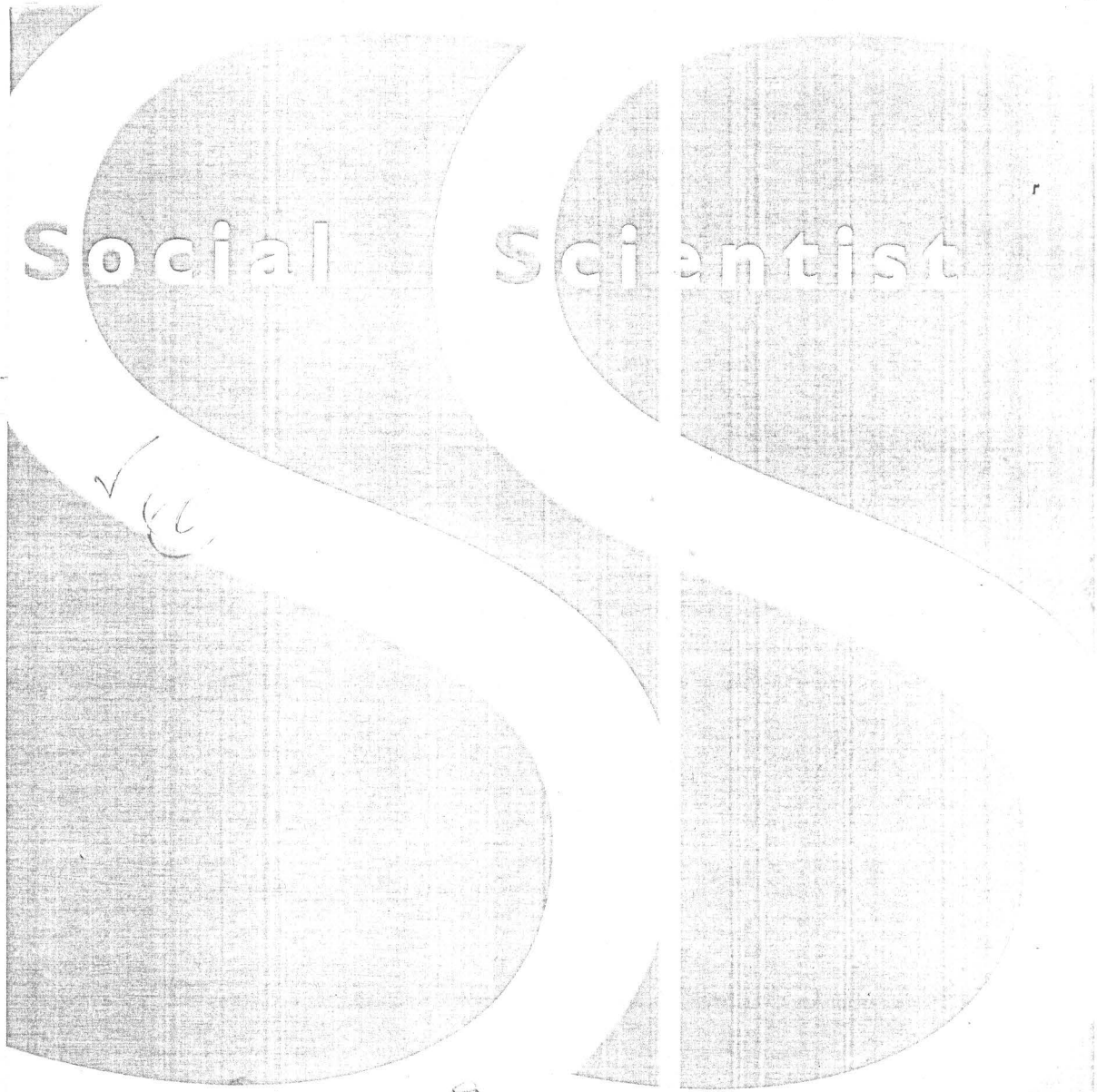
providing affordable and

accessible healthcare

### symposium participants

*Symposium  
Feb. 2011*

- 10 **THE PROBLEM**  
Posed by **K. Sujatha Rao**, former Union Health Secretary, GoI
- 15 **THE BHOSE COMMITTEE AND RECENT DEBATES**  
**Rama V. Baru**, Professor, Centre of Social Medicine and Community Health, Jawaharlal Nehru University, Delhi
- 19 **BACK TO BASICS**  
**Yogesh Jain**, public health physician and co-founder, Jan Swasthya Sahyog (people's health support group) in rural Bilaspur, Chhattisgarh
- 23 **MAKING FISCAL SPACE FOR SPENDING ON PUBLIC HEALTH**  
**M. Govinda Rao**, Former Director, National Institute of Public Finance and Policy (NIPFP); Member, Fourteenth Finance Commission, Bangalore
- 28 **CAN THE PRIVATE SECTOR HELP ACHIEVE UNIVERSAL HEALTHCARE?**  
**Anup Karan**, Additional Professor, Public Health Foundation of India, Delhi and **Sanjay Zodpey**, Vice President, Public Health Foundation of India and Director, Indian Institute of Public Health, Delhi
- 33 **MEDICAL EDUCATION NEEDS A RADICAL RETHINK**  
**Sita Naik**, retired as Professor and Head of Department of Immunology and Dean, Sanjay Gandhi Postgraduate Institute, Lucknow
- 38 **TECHNOLOGY: DRUGS AND DIAGNOSTICS IN HEALTH**  
**Sakthivel Selvaraj**, Director and Additional Professor, Health Economics, Financing and Policy, Public Health Foundation of India, Delhi and **Aashna Mehta**, Senior Research Associate, Public Health Foundation of India, Delhi
- 47 **RADICALIZING PUBLIC MENTAL HEALTHCARE IN INDIA**  
**Arjun Kapoor**, Research Associate and **Soumitra Pathare**, Director, Centre for Mental Health Law and Policy, Indian Law Society, Pune
- 52 **PROFESSIONALIZING PUBLIC HEALTH MANAGEMENT**  
**T. Sundararaman**, former Executive Director, National Health Systems Resource Centre; currently teaches at the School of Health Systems Studies, Tata Institute of Social Sciences, Mumbai and **Daksha Parmar**, Assistant Professor, Department of Humanities and Social Sciences, Indian Institute of Technology Guwahati
- 57 **REGULATION FOR BETTER GOVERNANCE**  
**Sunil Nandraj**, former Advisor, Ministry of Health and Family Welfare, GOI
- 61 **UNDERMINING MEDICAL ETHICS**  
**Abhay Shukla**, public health physician with SATHI, Pune; national joint convener of Jan Swasthya Abhiyan and **Arun Gadre**, MD obstetrics and gynecologist; Founder member, Alliance of Doctors for Ethical Healthcare, Pune
- 69 **COMMENT**  
**Ayushman Bharat**  
**Shiban Ganju**, Founder, Save a Mother Foundation; past consultant, University of Chicago Ingalls Hospital
- 68 **BOOKS**  
Reviewed by **K. Sujatha Rao** and **Shiban Ganju**
- 73 **IN MEMORIAM**  
**Mushirul Hasan 1949-2018**
- 75 **BACKPAGE**  
**COVER**  
Designed by [www.designosis.in](http://www.designosis.in)



# Social Scientist

12017

Nov-Dec 2018

546-547

Vol. 46 No. 11-12

<b>Thinking Radically with Gandhi</b> Akeel Bilgrami	3
<b>Gandhi's Sorrows</b> Sudhir Chandra	17
<b>Gandhi, Technology and Employment</b> Prabhat Patnaik	27
<b>The Story of Antaryami</b> Tridip Suhrud	37
<b>Tragical-Comical-Historical-Pastoral</b> Miklós Mesterházi	61
<b>Book Review</b>	93



# SRELS JOURNAL OF INFORMATION MANAGEMENT

Volume 55, Issue 6, December 2018

## CONTENTS

### Articles

- Knowledge Management using Ontology Based Tantra Framework for Good Governance  
Shreekanth M. Prabhu, K. N. Balasubramanya Murthy and S. Natarajan 299-308
- Exploring First Year Undergraduate Students' Information Literacy Skills:  
Experience at the Faculty of Management, University of Peradeniya, Sri Lanka  
Chamani Gunasekera 309-314
- The Accuracy of Newspaper Citation Count Reported and Actual Citation Found in  
Web of Science Citation Database  
Ravikumar and Sweetly Warjri 315-319
- Status of State Health Sciences Universities of India: A Webometric Analysis  
Sapna Rani, Payare Lal and Kushpreet Singh Brar 320-325
- Self-Citation Trends in SRELS Journal of Information Management (SRELS): An Evaluation  
Sunil Kumar Yadav, S. N. Singh and Manoj Kumar Verma 326-329
- Use of E-Resources in the e-ShodhSindhu Consortium: A Study of North Bengal University  
Library Users  
Shubhrangshu Kumar Mistri 330-333
- Role of Web 2.0 in Scholarly Communication: A Survey of Select Indian Institutes  
of Management (IIMs) in India  
Malkeet Singh and K.P. Singh 334-342
- Use of E-resources by the Faculty Members and Students in Economics in  
University of Delhi: A Study  
Suboohi Siddiqui 343-353

h11

© Sarada Ranganathan Endowment for Library Science

All rights reserved. No part of this publication may be reproduced in any material form including photocopying or storing it in any medium by electronic means and whether or not transiently or incidentally to some other use of this publication without the written permission of the copyright owner except in accordance with the provision of the Copyright Act. Requests for copyright owner's permission to reproduce any part of this publication should be addressed to the publishers.

## features

### 208 Tools to Support K–2 Students in Mathematical Argumentation

*Chepina Rumsey, Jody Guarino, Rachael Gildea, Christina Y. Cho, and Bethany Lockhart*

A yearlong professional development project investigated types of discourse and argumentation that students engage in, participation structures and routines that teachers can include to support students, and types of tasks that promote mathematical argumentation.

### 218 8 Teaching Moves Supporting Equitable Participation

*Marcy B. Wood, James Sheldon, Mathew D. Felton-Koestler, Joy Oslund, Amy Noelle Parks, Sandra Crespo, and Helen Featherstone*

Try these suggestions to increase the mathematical participation of each student.

### 224 “Sliding” into an Equitable Lesson

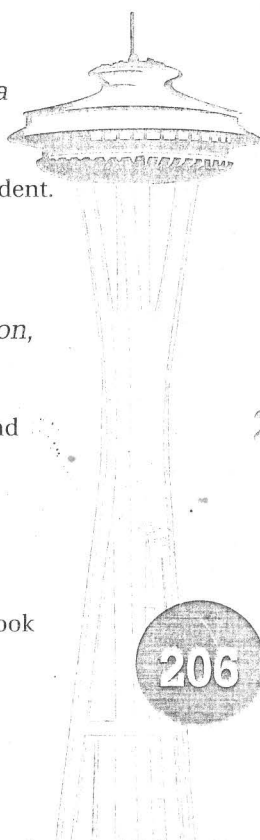
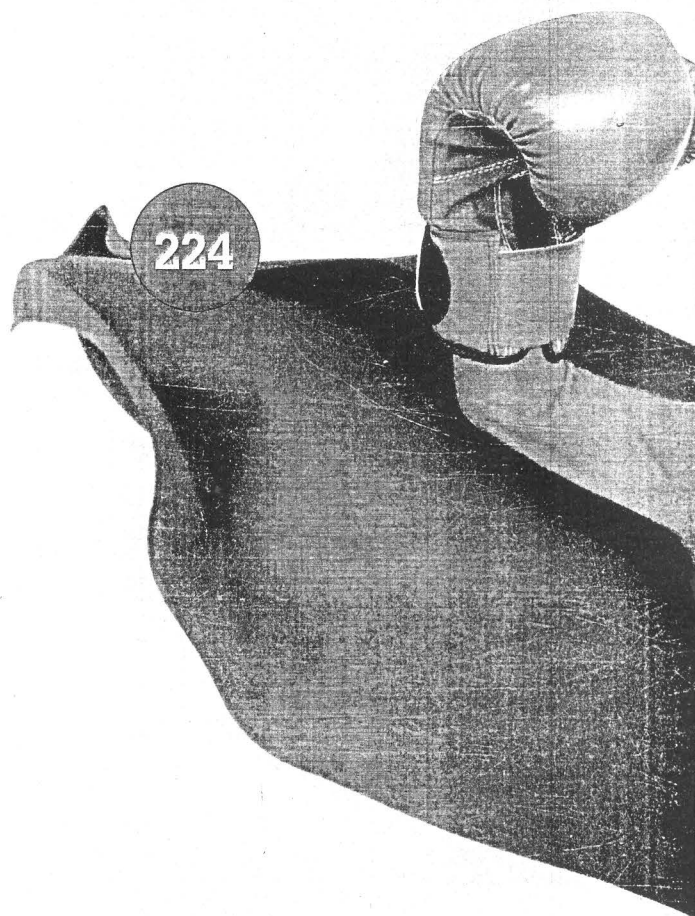
*Kelley Buchheister, Christa Jackson, and Cynthia Taylor*

A kindergarten teacher uses Gutiérrez’s Four Dimensions of Equity to design and facilitate geometry instruction.

### 232 Measuring Penn

*Mi Yeon Lee and Dionne Cross Francis*

Activities generated from a children’s book can support youngsters in developing conceptions of measurement.



### 242 Making Mathematical Discourse Worth Your While

*Claudia M. Bertolone-Smith and Linda Gillette-Koyen*

Avoid off-task behaviors, such as horseplay, rolling on the floor, and meowing, with a reliable routine that promotes students’ thinking, communication, and social safety in sharing their ideas.

# departments

- 197 news & views  
Moments of mathematics anxiety in the elementary classroom  
*Kathleen J. Stoehr*  
  
Guest editorial: Reflecting on 25 years of TCM  
*Jim Barta*  
  
Coaches' corner: The benefits of collaborative team planning time  
*Robyn Silbey*
- 201 problem solver :: solutions  
Revisiting the base-ten block challenge  
*Cathy M. Chaput and Beth Smith*
- 206 math by the month  
American landmarks  
*Donna Christy*
- 249 STEM  
Launching mathematical success  
*Dittika Gupta and Lara K. Dick*
- 254 reviewing and rereviewing  
Math games, tasks, and questions
- 256 postscript  
Changing the whole  
*Molly Rawding and Jean Kelly*

# remainders

241 Call for manuscripts: Imagine!  
*Mathematics Teacher: Learning and Teaching Pre-K-12 (MTL1)*

*Maths 101  
Exploring the world of  
mathematics*



- A table of topics, guiding questions, sample activities, and resources from the PD series in "Tools to Support K-2 Students in Mathematical Argumentation," p. 208
- A full-size activity sheet for "Sliding into an Equitable Lesson," p. 224
- A table of five activities for "Measuring Penny," p. 232



## in the next issue

† Authors Jessica Shumway and Jessica Hoggan asked themselves, "What does the (Common Core Math Content Standard) 2.OA.C.4 objective really mean?" and explored the importance of arrays as a foundation for multiplication in a second-grade classroom. In March, watch for their feature, "Developing Spatial Structuring with Quick Images."

# UNIVERSITY NEWS

A Weekly Journal of Higher Education

Vol. 57 No. 02

January 14-20, 2019

Special Issue  
on

## Social Development and Sustainability

on the Occasion of

### AIU East Zone Vice Chancellors' Meet-2019 at

### North Eastern Hill University, Shillong

(January 18-19, 2019)

**Editorial Committee Chairman** : Prof Furqan Qamar  
**Editorial Committee** : Dr Baljit Singh Sekhon  
: - Dr Amarendra Pani  
: Dr Youd Vir Singh

**Editor** : Dr Sistla Rama Devi Pani

14 JAN 2019  
UNIVERSITY NEWS  
310 310 310  
117 दिल्ली-110011

# Table of Contents

	PAGE
<b>Profile:</b> North Eastern Hill University, Shillong: A Profile	5
1. Educational Thoughts of Swami Vivekananda: A Pathway towards Sustainable Development — <i>Sunil Behari Mohanty</i>	10
2. Educational Philosophy of Swami Vivekananda — <i>Ramkishan M Manjre and Anuradha H Patil</i>	18
3. Learner Driven Higher Education for Social Development and Sustainability — <i>Chhaya Goel and Devraj Goel</i>	21
4. A Sustainable Future: Role of Industry, Education System and Society in Creating the Workforce for Tomorrow — <i>Kulwant Singh Pathania and Mahima Rana</i>	29
5. Opportunities and Threats Facing in Entrepreneurial Education — <i>R V Pazhani</i>	34
6. Centrally Sponsored Skill Development Programmes and Skill Based Training in India — <i>Ismail Thamarasseri</i>	43
7. Empowerment of Rural Women through Lifelong Skill Training — <i>Md. Nijairul Islam</i>	48
8. Entrepreneurial Intention among Management Graduates: An Analysis of Personal, Social and Economic Factors — <i>G Manoja and P G Arul</i>	54
9. Connected Learner Concept of Network: A Model for Optimising Distance Learning in the North Eastern Region — <i>J S Dorothy</i>	60
10. Sustainability and Rural Development Programmes in Mizoram: An Evaluation — <i>Debasish Paul and Lalfakawmi</i>	65
11. Present Status of Manipur University and Its Vision Document 2020 — <i>Fauzia Khan and Leisangthem Binita Devi</i>	71
12. Synergising Distance Education and Information and Communication Technology: A Study on the State of Meghalaya — <i>Ananya S Guha and Isagahah Lawrniang</i>	77
13. Effective Communication Skills: Enhanced Employability — <i>Amrita Maheshwari</i>	85
<b>Convocation:</b> Visva Bharati University, Santiniketan, West Bengal Tagore's Philosophy: An Epitome of Sustainable Humanity — <i>Narendra Modi</i>	89
<b>Campus News</b>	92
<b>Communications</b> Bharatiya Chhatra Sansad: A Movement for Purification of Indian Politics — <i>S N Pathan</i>	97
<b>Theses of the Month</b> (Science & Technology)	104
<b>Advertisements</b>	109

---

Opinions expressed in the articles are those of the contributors and do not necessarily reflect the views and policies of the Association

---

# UNIVERSITY NEWS

Vol. 57 January 21-27,  
No. 03 2019  
Price Rs. 25.00

A Weekly Journal of Higher Education  
Published by the Association of Indian  
Universities

In This Issue		PAGE
<b>Articles</b>		
Characterizing Interdisciplinary Thinking		3
Cliometrics as a Paradigm Shift in Historiography		9
Visualization of University Clusters based on NIRF and NAAC Scores: K-means Algorithm Approach		12
Staff Development for Quality Empowerment in Open and Distance Learning in India		16
<b>Convocation</b>		
Symbiosis International University, Pune		22
<b>Campus News</b>		
<b>Theses of the Month</b> (Science & Technology)		
		27
<b>Advertisements</b>		30

### The Subscription Tariff

	Inland		Foreign	
	Institutions	Academics/ Students	Airmail	Surface Mail
	<i>(at residential address only)</i>			
	Rs.	Rs.	US \$	US \$
1 year	950.00	375.00	210.00	170.00
2 years	1700.00	700.00	400.00	300.00

Subscription is payable in advance by Bank Draft/MO only in favour of Association of Indian Universities, New Delhi.

**Opinions expressed in the articles are those of the contributors and do not necessarily reflect the views and policies of the Association.**

#### Editorial Committee Chairman:

Prof Furqan Qamar

#### Editorial Committee :

Dr Baljit Singh Sekhon

Dr Amarendra Pani

Dr Youd Vir Singh

#### Editor :

Dr Sistla Rama Devi Pani

## Characterizing Interdisciplinary Thinking

Ravindra K S Choudhary\*

This paper is set to characterize interdisciplinary thinking because interdisciplinarity, though much in fashion and practice, lacks serious thinking. Even the practitioners of interdisciplinary research are not reflective enough to care for and be clear about what it means to think interdisciplinarily.

We have tried here first to get clear about the idea of interdisciplinarity explicitly as well as obliquely. Our concern is not confined to the direct question as to what interdisciplinarity really is, but we have also approached the issue obliquely by asking what it is not. We have thus looked into the nature of interdisciplinarity in the context of complex relationships it has developed with its common confusables. We go on to discuss the relation between the interdisciplinary and the disciplinary modes of thinking which has been remarkably paradoxical. Further, to understand the phenomenon at the level of actual practice, an attempt has also been made to identify the main trends in interdisciplinarity. On these bases, we have finally tried to point out the chief characteristics of interdisciplinary thinking.

### Interdisciplinarity: The Concept

Interdisciplinarity is generally construed as an approach of study and research in which we are concerned with the general interface and interaction between/among two or more disciplines. Accordingly, interdisciplinarity is broadly defined as "any form of dialogue or interaction between two or more disciplines" (Moran, 2002:16).

But an interdisciplinarian cannot remain confined to the general interaction. An interdisciplinary work has to address the challenges of diversity and complexity; it inevitably involves the task of integration. Thus, interdisciplinarity is defined as a process of answering a question, solving a problem, or addressing a topic that is too broad or complex to be dealt with adequately by a single discipline or profession and drawing on perspectives and integrating their insights by producing a more comprehensive understanding (Klein and Newell, 1997:393-94).

The point to be noted is that both, interaction and integration are essential to interdisciplinary study and research. Interdisciplinarity is "... the interaction among two or more disciplines that may range from simple communication of ideas to the mutual integration of organizing concepts, methodologies, procedures, epistemology, terminology, data and organization of research and education in a fairly large field" (UNESCO, 1972: 25).

Thus, an interdisciplinary research is that mode of research which

\*Faculty and Former Head, University Department of Philosophy, Vinoba Bhave University, Hazaribag-825301 (Jharkhand) raviksc@gmail.com

3/1/19  
10 40 40 90  
11-10

# UNIVERSITY NEWS

Vol. 57 January 28-  
No. 04 February 03, 2019  
Price Rs. 25.00

A Weekly Journal of Higher Education  
Published by the Association of Indian  
Universities

### In This Issue

ITEMS	PAGE
Articles	
Quality and Excellence Concerns in Higher Education	3
Problem of Plagiarism in India: Review of Recent University Grants Commission Regulation	7
Gujarati <i>Bhavai</i> as Performing Arts: Folk Theatre Drama	11
Effect of Guidance in Lesson Preparation and Presentation on Performance of Student Teachers	14
<b>Convocation</b>	
All India Institute of Medical Sciences, New Delhi	19
<b>Campus News</b>	22
<b>Theses of the Month</b> (Social Sciences)	26
<b>Advertisements</b>	30

### The Subscription Tariff

	Inland		Foreign	
	Institutions	Academics/ Students	Airmail	Surface Mail
	<i>(at residential address only)</i>			
	Rs.	Rs.	US \$	US \$
1 year	950.00	375.00	210.00	170.00
2 years	1700.00	700.00	400.00	300.00

Subscription is payable in advance by Bank Draft/MO only in favour of Association of Indian Universities, New Delhi.

Opinions expressed in the articles are those of the contributors and do not necessarily reflect the views and policies of the Association.

#### Editorial Committee Chairman:

Prof Furqan Qamar

#### Editorial Committee :

Dr Baljit Singh Sekhon

Dr Amarendra Pani

Dr Youd Vir Singh

#### Editor :

Dr Sistla Rama Devi Pani

## Quality and Excellence Concerns in Higher Education

M K Ghadoliya\*

Quality is a buzzword in higher education. But it means different things to different people. Do you define quality by increasing Gross Enrolment Ratio (GER), levels of educational attainment, student learning experience, research activities, or final educational outcome i.e. placement or on campus selection or something else. Perhaps you could add a few more to the list. Society and higher education sector worldwide care about quality. So we talk about quality. But our policy planners over the decades were concentrating so heavily on GER that the quality of colleges/ universities declined over the past few decades and will continue in the years to come if proper quality assurance measures are not implemented.

Nowadays universities/ colleges/higher education institutions are under public pressure to demonstrate their educational quality and to implement quality mechanism in each institution. At national level government of India has established National Assessment and Accreditation Council (NAAC) to ensure quality in higher education. UGC emphasises on establishment of Internal Quality Assurance Cell for the Universities and Colleges. Quality assurance agencies review the institutional quality procedures on a regular basis and share the information with the public in order to safeguard quality of universities and colleges. Students are also giving preference to those institutions for admissions which tops the quality ranking.

### Quality in Education: The Concept

Before answering about the question of quality in education let us first talk about the education itself. How do I see education? To me education is not an uncreative and mechanical process of gathering and storing 'information' that we pass off as knowledge. Computers can do this better than us. Real education implies transformation and not a mere transmission of facts and ideas. The quest for excellence has to do with acquiring knowledge and skills in the most creative way possible. But we often disconnect excellence from relevance and look at it only from the point of view of knowledge for the sake of knowledge or knowledge for success. Relevance has to do with students larger priorities about themselves and the world they live in.

### Expectations from Educational Institutions

Institutes of higher education, through their curriculum, are expected to provide knowledge, know-how, wisdom, and character to the students.

\*Professor, School of Commerce and Management, RNB Global University, RNB Global City, Ganganagar Road, Bikaner-334601(Rajasthan)

# UNIVERSITY NEWS

Vol. 57 February 18-24,  
No. 07 2019  
Price Rs. 25.00

A Weekly Journal of Higher Education  
Published by the Association of Indian  
Universities

### In This Issue

ITEMS	PAGE
<b>Articles</b>	
The Impact of Ranking, Rating and Research on Higher Education Institutions	3
Chasing 3 Es (Equity, Expansion and Excellence) in Higher Education: A Study of India and China	8
Determinants of University Choice Decision and Satisfaction of Students: A Case Study	17
Construction of the Value Assessment Questionnaire	25
<b>Convocation</b>	
National Institute of Technology, Tiruchirappalli	30
<b>Campus News</b>	33
<b>Theses of the Month</b> (Science & Technology)	38
<b>Advertisements</b>	41

### The Subscription Tariff

	Inland		Foreign	
	Institutions	Academics/ Students	Airmail	Surface Mail
	<i>(at residential address only)</i>			
	Rs.	Rs.	US \$	US \$
1 year	950.00	375.00	210.00	170.00
2 years	1700.00	700.00	400.00	300.00

Subscription is payable in advance by Bank Draft/MO only in favour of Association of Indian Universities, New Delhi.

**Opinions expressed in the articles are those of the contributors and do not necessarily reflect the views and policies of the Association.**

#### Editorial Committee Chairman:

Prof Furqan Qamar

#### Editorial Committee :

Dr Baljit Singh Sekhon

Dr Amarendra Pani

Dr Youd Vir Singh

#### Editor :

Dr Sistla Rama Devi Pani

## The Impact of Ranking, Rating and Research on Higher Education Institutions

S P Singh\*

The purpose of Higher Education (HE) is to open the pathway to a horizon of improved and evolved thinking skills, intensive research, entrepreneurship, employability, industrial collaborations, international competitiveness, excellent approach to learning and establishing essentially a better process of dissemination of knowledge which leads to innovation of anything and everything for the better good of the society in large. The HE, in India is in need for greater autonomy for it to live its purpose of existence as at present, is controlled and weighed down by six or more bodies in authority limiting its expansion. It is disappointing to accept that India did not feature in the top 250 of global rankings of (HEIs). Autonomy, therefore for HEIs particularly those that engage in research along with education is widely acknowledged.

There are four important dimensions of HEIs/university autonomy namely Academic, Financial, Organisational and Staff Management. Academic Autonomy suggests that the institution has the freedom to select potential students, the modification of curricula, to define the various fields of research, their aims and methodologies as well as the execution of appropriate mechanisms for quality assurance. Financial autonomy implies the setting of tuition fees, budget preparation, while organisational autonomy means HEIs/universities can design, implement and modify their structures and Autonomy, finally, includes the recruitment of academic and management personnel, the formation of salaries and the processes for promotion of faculty and staff.

HEIs/Universities in India need major changes in their organisational structures and functioning to be able to respond adequately to current social expectations. A greater provision of funds and an increase of HEIs/university autonomy are priorities of today's education policy.

Academic Autonomy is the first step to 'Academic Excellence' as it gives the institution the right to take decisions in the choice of curriculum, examination patterns and assessment. This will help the universities in the realization of objectives, clarity of vision of the institution and make the institution spiritually strong enough to be an agent of change in the Indian society.

In order to improve the international ranking of Indian HEIs/universities and meet today's global challenges, it is important for them to improve research and academic excellence. But in order to get there, financial viability is needed. However, there are opposing views regarding financial autonomy; it is perceived at many quarters that complete freedom from financial regulations by government will lead to commercialisation

\*Vice Chancellor, The Assam Royal Global University, Betkuchi, Opp. Tirupati Balaji Temple, NH 37, Guwahati 78105 (Assam)

122

# UNIVERSITY NEWS

Vol. 57 February 25-  
No. 08 March 03, 2019  
Price Rs. 25.00

A Weekly Journal of Higher Education  
Published by the Association of Indian  
Universities

### In This Issue

ITEMS	PAGE
Articles	
Higher Education and Social Development in India: Prospects and Challenges	3
Indian Teacher Education Whither To ?	6
Practice Periods: An Innovation for Maximizing Students' Learning in Business Studies	9
Enhancing Employability for Indian Graduates	17
<b>Presidential Address</b>	
Association of Indian Universities, New Delhi	24
<b>Campus News</b>	30
<b>Theses of the Month</b> (Social Sciences)	33
<b>Advertisements</b>	37

### The Subscription Tariff

	Inland		Foreign	
	Institutions	Academics/ Students	Airmail	Surface Mail
	<i>(at residential address only)</i>			
	Rs.	Rs.	US \$	US \$
1 year	950.00	375.00	210.00	170.00
2 years	1700.00	700.00	400.00	300.00

Subscription is payable in advance by Bank Draft/MO only in favour of Association of Indian Universities, New Delhi.

**Opinions expressed in the articles are those of the contributors and do not necessarily reflect the views and policies of the Association.**

#### Editorial Committee Chairman:

Prof Furqan Qamar

#### Editorial Committee :

Dr Baljit Singh Sekhon

Dr Amarendra Pani

Dr Youd Vir Singh

#### Editor :

Dr Sistla Rama Devi Pani

## Higher Education and Social Development in India: Prospects and Challenges

S Ramachandram\* and C Ganesh\*\*

The key to harnessing India's demographic dividend is education. Education alone would contribute for social development and sustainability. The developing country like India should mould the education system in such a way that ultimately it must results into the achievement of social development and sustainable development. India with second largest population is home to the third largest higher education system in the world by volume of students enrolled. It is likely to surpass the United States of America (USA) in the next five years and China in the next 15 years to be the largest system of higher education in the world. By 2030, India will be amongst the youngest nations in the world. With nearly 140 million people in the college-going age group, one in every four graduates in the world will be a product of the Indian education system. It has recorded impressive growth and undertaken colossal extension during post-independent period with a national resolve to establish several Universities, Technical Institutes, Research Institutions and Professional/Non-professional Colleges all over the country to generate and disseminate knowledge coupled with the noble intention of providing easy access to higher education to the common Indian, which in turn would contribute for social development. The Public initiatives played a dominant and controlling role in this phase. Most of the Universities were Public institutions with powers to regulate academic activities on their campuses as well as in their areas of jurisdiction through the affiliating system.

Indian higher education has taken a paradigm shift to provide wider opportunities to pursue Higher Education in India. The access to Higher Education has increased for all sections of the society. This trend can widely be seen as aftermath of liberalization, privatization and globalization. However, the system has many issues of concern at present, like financing and management including access, equity and relevance, reorientation of programmes by laying emphasis on health consciousness, values and ethics and quality of higher education together with the assessment of institutions and their accreditation. These issues are important for the country, as it is now engaged in the use of higher education as a powerful tool to build a knowledge-based information society of the 21<sup>st</sup> Century. Recognizing the above and the basic fact, that the Higher Educational System ought to perform multiple roles, like creating new knowledge, acquiring new capabilities and producing an intelligent human resource pool, through challenging teaching, research and extension activities so as to balance both the need and the demand.

\*Vice Chancellor, Osmania University, Hyderabad – 500 007 (Telangana)

\*\*Professor of Sociology & Director, PGRRCDE, Osmania University, Hyderabad – 500 007 (Telangana)

123

Follow us on facebook - <https://www.facebook.com/pages/Yojana-Journal>

February 2019

Volume-63

No. 2



ISSN-0971-8400

Website: [www.yojana.gov.in](http://www.yojana.gov.in)

YOJANA  
Since 1956 A DEVELOPMENT MONTHLY

Let noble thoughts come to us from all sides  
Rig Veda

CHIEF EDITOR  
SHAMIMA SIDDIQUI

SENIOR EDITOR  
SHYAMALA MANI IYER

JOINT DIRECTOR (PRODUCTION)  
VINOD KUMAR MEENA

COVER DESIGN  
GAJANAN PRALHADRAO DHOPE

OUR REPRESENTATIVES

Ahmedabad: Janhavi Patel, Bengaluru: B.K. Kiranmai  
Bhubaneswar: Girish Chandra Dash, Chennai:  
Sanjay Ghosh, Hyderabad: Vijayakumar Vedagiri,  
Jalandhar: Gagandeep Kaur Devgan, Kolkata:  
Khurshid Malik, Mumbai: Umesh Sadashivarao  
Ujgare: Thiruvananthapuram: Roy Chacko

Chief Editor's Office : Room No. 660, Soochna  
Bhawan, CGO Complex, Lodhi Road New Delhi  
110 003 Phone: 24362971

Yojana (English): Room No. 647, Soochna Bhawan,  
CGO Complex, Lodhi Road, New Delhi - 110 003.  
E-mail (Editorial) : [yojanace@gmail.com](mailto:yojanace@gmail.com)

YOJANA seeks to provide a vibrant platform for  
discussion on problems of social and economic  
development of the country through in-depth  
analysis of these issues in the wider context of  
government policies. Although published by  
the Ministry of Information and Broadcasting,  
YOJANA is not restricted to expressing the official  
point of view.

*DISCLAIMER: The views expressed in various  
articles are those of the authors' and they do not  
necessarily reflect the views of the Government  
or the organisation they work for. Maps/flags  
used in the articles are only indicative. They don't  
reflect the political map or legal representation  
of the flag of India/any other country. The  
readers are requested to verify the claims  
made in the advertisements regarding career  
guidance books/institutions. YOJANA does not  
own responsibility regarding the contents of the  
advertisements.*

SUBSCRIPTION

1 year ₹ 230, 2 years ₹ 430, 3 years ₹ 610.

For new subscriptions, renewals and  
complaints, please contact : Ph: 011 24367453  
or e-mail your queries to : [pdjucir@gmail.com](mailto:pdjucir@gmail.com)

Business Manager (Hqs.) : SURYA KANT  
SHARMA Phones: 011-24367260, 24365609,  
24365610 Publications Division, Room No. 48-53,  
Soochna Bhawan, CGO Complex, Lodhi Road, New  
Delhi 110 003.



Website: [www.publicationsdivision.nic.in](http://www.publicationsdivision.nic.in)  
@DPD\_India

IN THIS ISSUE

POWER FOR ALL – A DREAM  
COMING TRUE  
R K Singh..... 7

PM LAUNCHES SEVERAL  
INFRASTRUCTURE PROJECTS..... 12

MULTI-PRONGED APPROACH TO  
URBAN TRANSFORMATION  
Durga Shanker Mishra ..... 14

**SPECIAL ARTICLE**  
NATIONAL WATER WAYS:  
INTEGRATED TRANSPORT  
NETWORK  
Pravir Pandey..... 27

WATER RESOURCES AND  
GANGA REJUVENATION-RECENT  
MILESTONES..... 36

**FOCUS**  
UDAN – GIVING NEW MEANING TO  
AIR CONNECTIVITY  
Usha Padhee..... 39

BHARATMALA PARIYOJANA: THE  
BIGGEST REVOLUTION IN INDIAN  
HIGHWAYS  
D. Dash ..... 42

DO YOU KNOW? .....33  
NORTH EAST DIARY ..... 71

No. of Pages 80

New Delhi	Soochna Bhawan, CGO Complex, Lodhi Road	110003	011-24365610
Delhi	Hall No.196, Old Secretariat	110054	011-23890205
Navi Mumbai	701, B Wing, 7th Floor, Kendriya Sadan, Belapur	400614	022-27570686
Kolkata	8, Esplanade East	700069	033- 22486696
Chennai	'A' Wing, Rajaji Bhawan, Basant Nagar	600090	044-24917673
Thiruvananthapuram	Press road, Near Govt. Press	695001	0471-2330650
Hyderabad	204 II Floor CGO Towers, Kavadiguda, Secundrabad	500080	040-27535383
Bengaluru	1st Floor, 'F' Wing, Kendriya Sadan, Koramangala	560034	080-25537244
Patna	Bihar State Co-operative Bldg, Ashoka Rajpath	800004	0612-2675823
Lucknow	Hall No 1, 2nd floor, Kendriya Bhawan, Sector-H, Aliganj	226024	0522-2325455
Ahmedabad	2nd Floor, Akhandanand Hall, Bhadra, Mother Teresa Road	380001	079-26588669

TRANSFORMING CONNECTIVITY:  
INDIAN RAILWAYS ON THE GO  
Deepak Razdan ..... 47

CONNECTED NORTH EAST:  
BUILDING PAN INDIA TIES  
Namita Tewari ..... 54

AFFORDABLE HOUSING: TAKING  
CENTRE STAGE  
Ranjeet Mehta ..... 58

THE SANITATION REVOLUTION -  
CREATING INFRASTRUCTURE .... 63

INVESTING IN CHILDREN:  
INVESTING IN THE FUTURE  
S S Mantha ..... 66

SPORTS INFRASTRUCTURE:  
FIRST CENTRAL UNIVERSITY IN  
INDIA, FOCUSING SOLELY  
ON SPORTS EDUCATION ..... 69

CREATING ADEQUATE  
INFRASTRUCTURE IN HEALTH CARE  
Sanjeev Kumar..... 72

ABOUT OUR BOOKS..... 78

REGU IRS

Sales Enquiry

YOJANA is published in Assamese, Bengali, English, Gujarati, Hindi, Kannada, Malayalam, Marathi, Odia, Punjabi, Tamil, Telugu and Urdu.