EDUDOC SERVICES: CURRENT CONTENT



CURRENT CONTENTS

July to September– 2021

LIBRARY AND DOCUMENTATION DIVISION

NATIONAL INSTITUTE OF EDUCATION

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Compiled By

J.P. Anand

Introduction

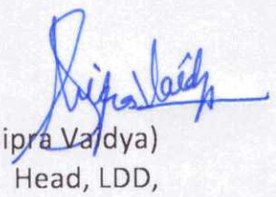
"**Current Contents**" prepared by Library and Documentation Division aims to identify the articles published in the learned journals received by the library in the month of July-September 2021.

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. Shipra Vaidya)
Head, LDD,
NCERT, New Delhi

Sr. No.	Name of Journals	Vol.	Issue	Month	Year	Pages
❖	**Biology**					
1.	American Biology Teacher	83	3	Mar	2021	04
2.	Biochemistry and Molecular Biology Education	49	3	May-Jun	2021	28-30
3.	Journal of Biological Education	55	2	Apr	2021	147
❖	**Curriculum**					
4.	Curriculum Inquiry	50 51	3 4 5 1 2	Jun Sep Dec Jan Mar	2020 2021	79-83
5.	Curriculum and Teaching	36	1	Jan-Jun	2021	78
❖	**Economics**					
6.	Economic and Political weekly	56	26&27 26&27 Suppl. 28 29 30 31 32 33 34 35 36 37 38	26 Jun 26 Jun 10 Jul 17 Jul 24 Jul 31 Jul 7 Aug 14 Aug 21 Aug 28 Aug 4 Sep 11 Sep 18 Sep	2021	90-102
7.	Economics of Education Review	82		Jun	2021	103
8.	Journal of Economic Education	52	1 2 3	Jan-Mar Apr- Jun Jul-Sep	2021	168-170
9.	The Indian Economic and Social History Review	58	2	Apr-Jun	2021	129
❖	**Education**					
10.	Assessment in Education:Principles, Policy & Practice	28	1 2	Feb Apr	2021	22-23
11.	Bhartiya Adhunik Shiksha	40	1 2	Jul Oct	2019	24-27
12.	Cambridge Journal of Education	51	2 4	Apr Aug	2021	39-40
13.	Educational Policy	35	4 5	Jun Jul	2021	110-111
14.	International Journal of Inclusive Education	25	7-8	Jun	2021	139
15.	Journal of Indian Education	44 45	4 1 2 3	Feb May Aug Nov	2019 2019	188-195

❖	**Educational Psychology**					
16.	British Journal of Educational Psychology	91	1 2	Mar Jun	2021	31-32
17.	Educational Psychologist	56	1 2 3	Jan-Mar Apr-Jun Jul-Sep	2021	112-114
18.	Educational Psychology in Practice	37	2	Jun	2021	115
19.	Journal of Educational Psychology	112	5 6 7 8	Jul Aug Oct Nov	2020	171-178
❖	**Educational Research**					
20.	शैक्षणिक संदर्भ	75	132	Jan-Feb	2021	360
21.	American Educational Research Journal	58	3	Jun	2021	05
22.	Applied Measurement in Education	34	1	Jan-Mar	2021	19
23.	Educational Action Research: an International Journal	29	3	Jul-Sep	2021	104
24.	Educational Assessment,Evaluation and Accountability	33	1 2 3	Feb May Aug	2021	105-107
25.	Educational Evaluation and Policy Analysis	43	2	Jun	2021	108
26.	Educational Measurement: Issues and Practice	40	2	Summer	2021	109
27.	Indian Educational Review	56 57	2 1	Jul Jan	2018 2019	130-131
28.	Journal of Educational Research	114	1-3	Jan-Jun	2021	179-180
29.	Review of Educational Research	91	3	Jun	2021	359
30.	Scandinavian Journal of Educational Research	65	1 4	Feb Jun	2021	361-362
❖	**Educational Technology**					
31.	British Journal of Educational Technology	52	3 4	May Jul	2021	33-36
32.	Computers and Education	159		Dec	2020	46-47
33.	Journal of Computer Assisted Learning	37	3 4	Jun Aug	2021	148-149
34.	Science, Technology and Society: An International Journal	26	2	Jul	2021	401
35.	Technology; Pedagogy and Education	30	2	Apr	2021	420
❖	**Environmental Education**					
36.	Down To Earth	29 30	23 24 6 7	16-30 Apr 1-15 May 1-15 Aug 16-31 Aug	2021	84-89
37.	Environmental Conservation	48	2	Jun	2021	18
38.	Globalisation, Societies and Education	19	2 3 4	Apr Jun Aug	2021	126-128

39.	International Research in Geographical and Environmental Education	30	1 3	Feb Aug	2021	140-141
40.	Journal of Environmental Education	52	1-3	Mar May	2021	183-184
41.	Resurgence & Ecologist		327	Jul-Aug	2021	357-358
❖	**Geography**					
42.	The Geographical Journal	187	2	Jun	2021	121
43.	The Geography Teacher	18	1 2 3-4	Jan-Mar Apr-Jun Jul-Dec	2021	122-125
44.	Journal of Geography	120	3	May-Jun	2021	185
45.	National Geographic Magazine	8 9	4 5 12 1 2	Nov Dec Jul Aug Sep	2020 2021	268-278
46.	Teaching Geography*	42 44 45	3 3 3	Autumn Autumn Autumn	2017 2019 2020	417-419
❖	**Higher Education**					
47.	University News	59	14 25	5 Apr 21 Jun	2021	422-423
❖	**Library Science**					
48.	Library Herald : Journal of the Delhi Library Association	59	1 2	Mar Jun	2021	
49.	SRELS Journal of Information Management	58	1 2 3	Feb Apr Jun	2021	412-414
❖	**Linguistics**					
50.	ELT Journal	75	1	Jan	2021	116-117
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53.	Language Learning	71 71	2 3 Suppl.	Mar Mar	2021 2021	214-217
54.	Natural Language and Linguistic Theory	39	1 3	Feb Aug	2021	178-280
❖	**Mathematics Education**					
55.	Journal of Mathematics Teacher Education	24	4	Aug	2021	209
56.	Mathematical Thinking and Learning	23	1 2 3	Jan-Mar Apr-Jun Jul-Sep	2018	221-223

57.	Mathematics Teacher	113 114	1 2 3 4 5 6 7 8 9 10 11 12 1 2 3 4 5 7 8 9 10	Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Jan Feb Mar Apr May Jul Aug Sep Oct	2020 2021	224-265
58.	Mathematics Teaching		275 276 277	Feb Apr Jul	2021	266-268
59.	School Science and Mathematics	121	5	May	2021	364
❖	**Physics**					
60.	American Journal of Physics	89	6 7 8	Jun Jul Aug	2021	6-11
61.	Physics Education	56	3 4	May Jul	2021	293-298
62.	Physics Today	73 74	4 5 6 7 8 9 10 11 12 1 2 3 5 6 7 8	Apr May Jun Jul Aug Sep Oct Nov Dec Jan Feb Mar May Jun Jul Aug	2020 2021	299-330
63.	Physics World	34	3 5 6 7 8	Mar May Jun Jul Aug	2021	331-335

❖	**Population Education**					
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❖	**Psychology**					
65.	American Psychologist	75	8 9	Nov Dec	2020	12-18
66.	Cognitive Psychology	126 127 128		May Jun Aug	2021	43-45
67.	Journal of Applied Developmental Psychology	74 75		May-Jun, Jul-Aug	2021	142-143
68.	Journal of Applied Social Psychology	51	5 6 7	May Jun Jul	2021	144-146
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71.	Journal of Cross-Cultural Psychology	52	3 4	Apr May	2021	165-166
72.	Journal of Humanistic Psychology	61	3	May	2021	186
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74.	Psychological Review	128	4	Jul	2021	343-344
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❖	**Science**					
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77.	New Scientist	250	3338 3339 3340 3341 3342 3343 3344 3345 3346 3347 3348 3349	12 Jun 19 Jun 26 Jun 3 Jul 10 Jul 17 Jul 24 Jul 31 Jul 7 Aug 14 Aug 21 Aug 28 Aug	2021	281-292
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❖	**Science Education**					
79.	Journal of Research in Science Teaching	58	4 5 6	Apr May Aug	2021	211-213
80.	Journal of Research in Science Teaching	53	5	May	2016	
81.	Journal of the Learning Science	30	1	Jan-Mar Apr-Jun Jul-Aug	2021	206-208
82.	Resonance: Journal of Science Education	26	6 7 8	Jun Jul Aug	2021	353-356
83.	Science Education	105	2 3 4	Mar May Jul	2021	398-400
84.	Scientific American	324 325 325	5 2 3	May Aug Sep	2021 2021 2021	402-407
85.	School Effectiveness and School Improvement	32	2	Jun	2021	363
86.	School Science Review	102	380 381	Mar Jun	2021	365-367

❖	**Social Science**					
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88.	Man and Development *	43	2	Jun	2021	220
89.	Seminar	743 744		Jul Aug	2021	408-409
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92.	Studies in History	37	1	Feb	2021	415-416
93.	Yojana	65	8 9	Aug Sep	2021	424-425
❖	**Special Education**					
94.	Assessment for Effective Intervention	46	1 3	Dec Jun	2020 2021	20-21
95.	British Journal of Special Education	48	1 2	Mar Jun	2021	37-38
96.	European Journal of Special Needs Education	36	2	May	2021	119
97.	Intellectual and Developmental Disabilities	59	3 4	Jun Aug	2021	137-138
98.	Remedial and Special Education	42	1 3	Jan-Feb Jun	2021	351-352
99.	Topics in Early Childhood Special Education	40	4	Feb	2021	421
100.	Journal of Learning Disabilities	53 54	1 2 3 4 5 6 2 3 4	Jan-Feb Mar-Apr May-Jun Jul-Aug Sep-Oct Nov-Dec Mar-Apr May-Jun Jul-Aug	2020 2021	196-205
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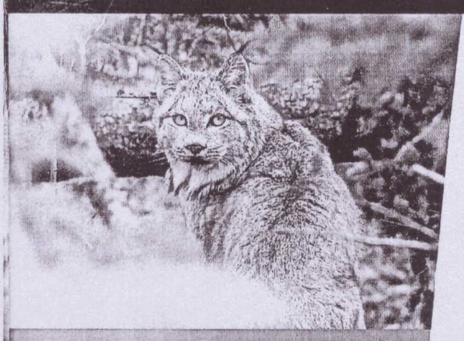
THE AMERICAN BIOLOGY TEACHER



About Our Cover

The Canada lynx (*Lynx canadensis*) is a medium-sized, short-bodied, stubby-tailed, long-legged member of the family Felidae. It is often confused with its close cousin the bobcat (*L. rufus*).

The lynx is an apex predator whose diet consists primarily of snowshoe hare (they eat one hare every one to two days), especially when hares are abundant. When hare densities drop, the lynx's diet can include red squirrels, grouse, ptarmigan, and other birds, as well as small mammals like squirrels, voles, and mice. Lynx are good swimmers and climbers but appear to hunt predominantly on the ground.

Lynx generally mate between March and April, and kittens are born from May to July, depending on latitude. Litter sizes of one to several kittens vary with prey availability and appear to be tied to what has become known as the 10-year lynx–hare cycle, a renowned predator–prey cycle that is taught in all general ecology courses. The amplitude of the cycle is at its highest in northern boreal forests and appears less pronounced on the southern periphery of their range. Individuals may live up to 15–16 years, but ~10 years is more common.

The Canada lynx likely descended from the Eurasian lynx when that cat invaded North America ~200,000 years ago. Lynx are currently well known and widely distributed throughout dense boreal forests of Alaska and Canada, but only throughout some of the more northern contiguous U.S. states, where they are threatened with habitat loss. Home range sizes for lynx vary widely, depending on many factors (primarily prey abundance), but are known to range from tens to hundreds of square kilometers. Lynx are still trapped for their fur in Canada and Alaska, but trapping is restricted in the lower 48 states. *Lynx canadensis* is classified by the International Union for Conservation of Nature as of "least concern" but is listed locally by some states and provinces as threatened or endangered.

Roy Rea, a Biology Instructor at the University of Northern British Columbia, captured this photo while photographing grouse near Quesnel, BC, on a frosty, fall day with a Canon 5D Mark 3 and a Canon 300mm/2.8 lens and 2× extender.

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*Article(s) accepted under the coeditorship of Mark Berends, Francesca López, Julianne C. Turner, and Suzanne Wilson.

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AMERICAN JOURNAL of PHYSICS

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Cover figure: Water shoots higher if the outlet of a garden hose is partially blocked. The fluid dynamics explaining this effect is non-trivial but understandable at an undergraduate level.

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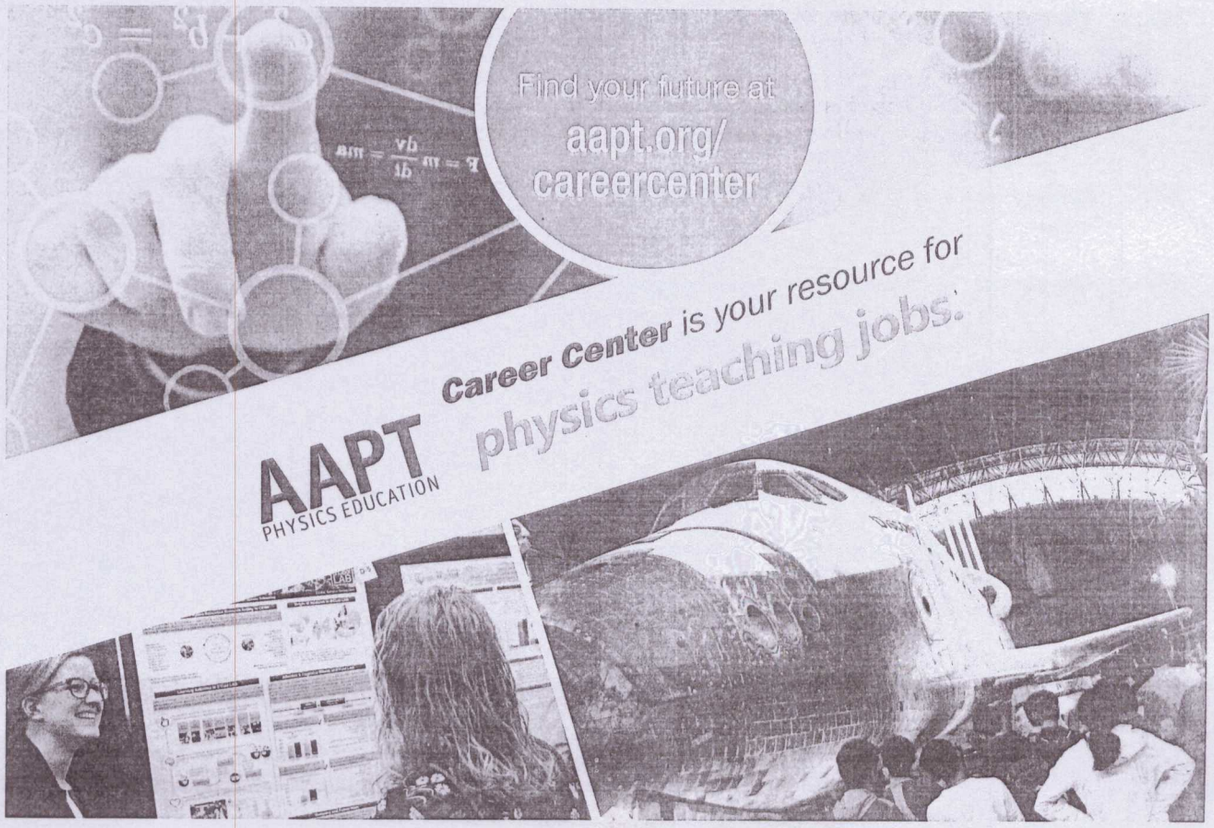

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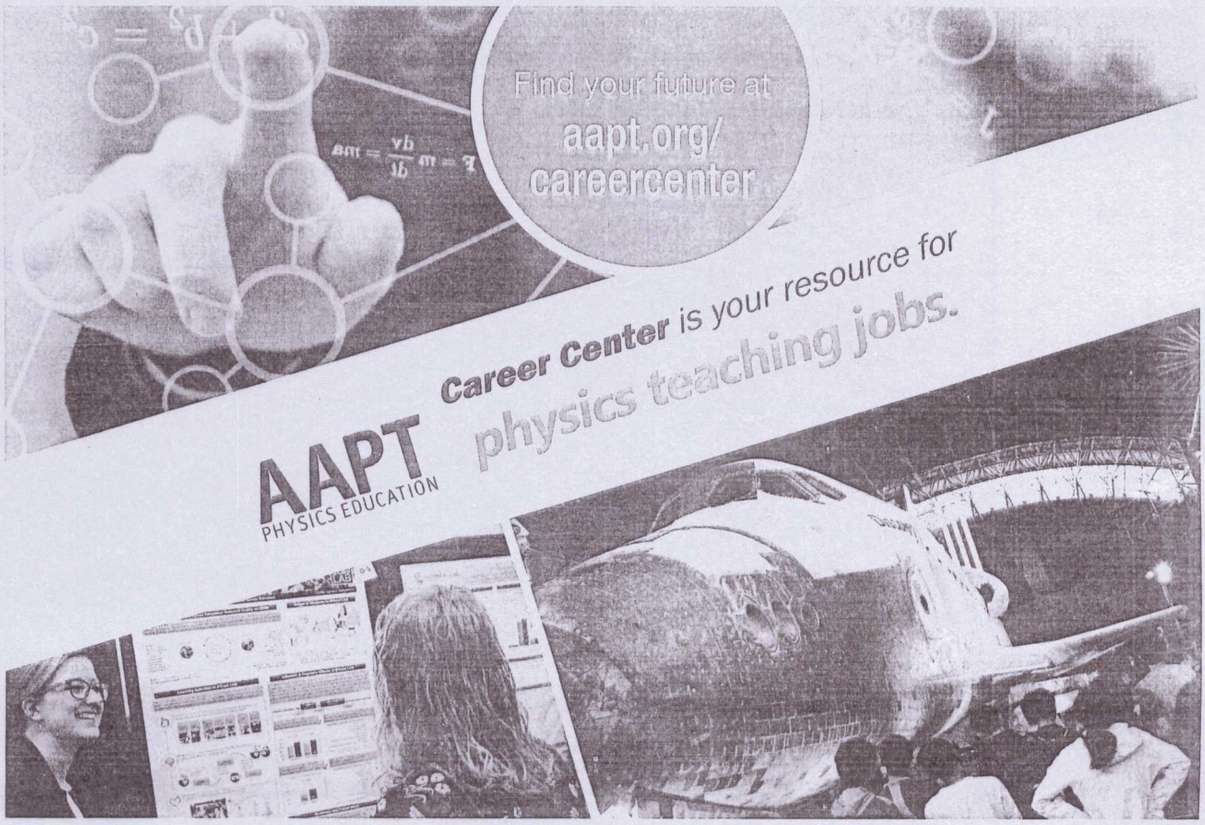

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Cover figure: The force required to move the plunger in a French press coffee brewer can be measured using weights in an at-home experiment or using a LoadTracII vertical uniaxial press.

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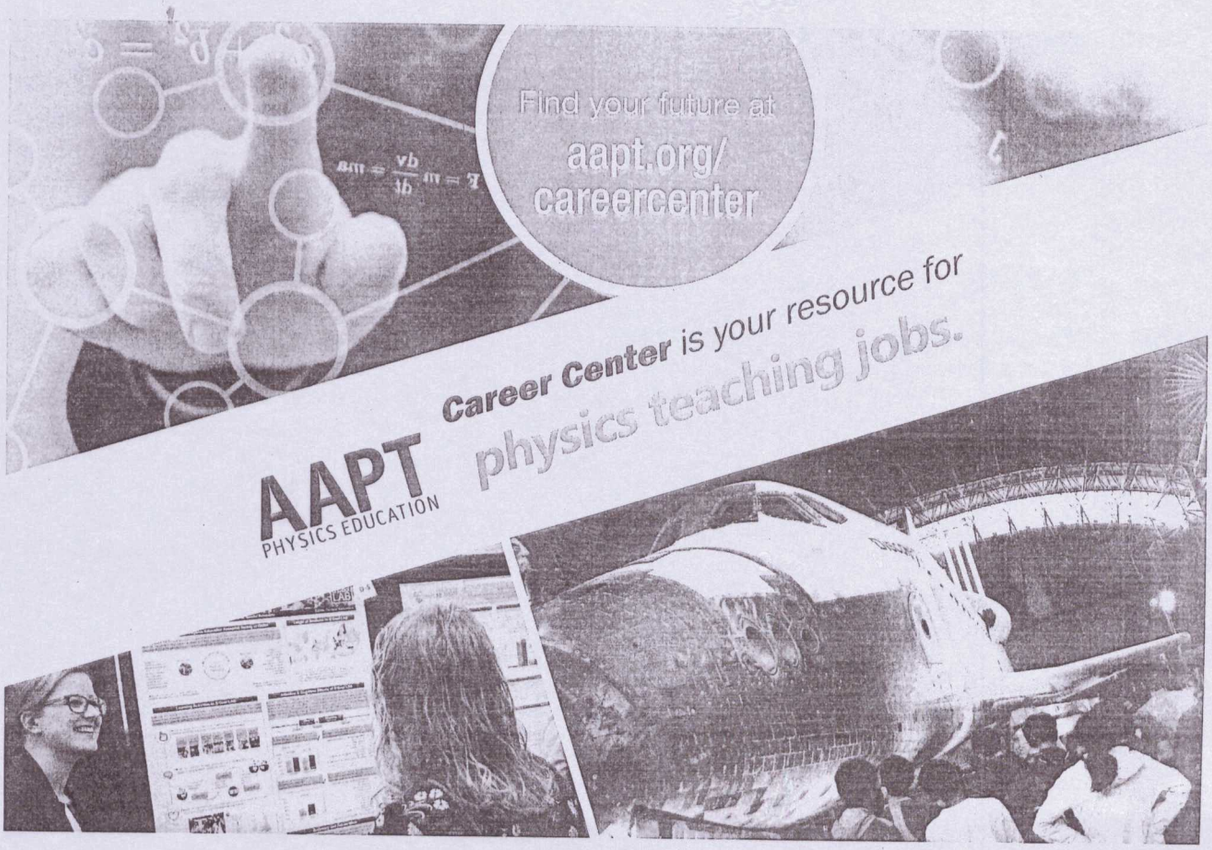

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On the cover: Channel, *2019, by Mark Craig. Acrylic, oil, and collage on canvas, 48 inches by 48 inches. Courtesy of the artist, https://www.markcraiggallery.com/ and https://elainefleckgallery.com/. See p. 1183 for more about Craig and his art.*

Special Issue: Expanding the Reach of Psychological Science Through Implementation Science

Special Issue Editors: Shannon Wiltsey Stirman, Rinad S. Beidas, and Anne E. Kazak

1033 Expanding the Reach of Psychological Science Through Implementation Science: Introduction to the Special Issue
Shannon Wiltsey Stirman and Rinad S. Beidas

Implementation science is the study of methods to promote the reduction of the research-to-practice gap in order to improve practice and people's lives. In this article, the authors introduce a special issue at the intersection of implementation science and psychological science, with exemplars of work representing this nexus and recommendations for future research.

Using Psychological Science to Engage Stakeholders and Implement Evidence-Based Practices

1038 User-Informed Marketing Versus Standard Description to Drive Demand for Evidence-Based Therapy: A Randomized Controlled Trial
Sara J. Becker, Sarah A. Helseth, Tonya L. Tavares, Daniel D. Squires, Melissa A. Clark, Valarie A. Zeithaml, and Anthony Spirito

Direct-to-consumer marketing represents a promising, yet underutilized strategy to disseminate evidence-based therapy (EBT). This three-phase study describes the development and evaluation of direct-to-consumer marketing materials about EBT for adolescent substance use, designed specifically for parents. Findings provide evidence that, relative to standard dissemination efforts, direct-to-consumer marketing materials are effective in increasing consumers' behavioral intentions to seek out EBT when carefully tailored to the target population.

1052 Toward the Data-Driven Dissemination of Findings From Psychological Science
Jonathan Purtle, Jacob S. Marzalik, Raquel W. Halfond, Lynn F. Bufka, Bethany A. Teachman, and Gregory A. Aarons

Dissemination strategies are typically informed by anecdote, not evidence, and are thus often ineffective. This article draws from persuasion theory and consumer psychology research to detail a research approach for "data-driven dissemination." The approach has three parts: formative audience research, audience segmentation research, and dissemination effectiveness research.

1067 Leveraging Human-Centered Design to Implement Modern Psychological Science: Return on an Early Investment
Aaron R. Lyon, Stephanie K. Brewer, and Patricia A. Areán

Implementation of evidence-based practices requires careful attention to the characteristics of interventions that make them more or less usable. This article describes how human-centered design, which grounds intervention development in the needs of real-world people and settings, can advance the core tasks of implementation in psychology; including the development or redesign of psychosocial interventions and implementation strategies to ensure their contextual appropriateness and impact.

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Digital Mental Health Implementation

1080 Implementation Strategies for Digital Mental Health Interventions in Health Care Settings
Andrea K. Graham, Emily G. Lattie, Byron J. Powell, Aaron R. Lyon, Justin D. Smith, Stephen M. Schueller, Nicole A. Stadnick, C. Hendricks Brown, and David C. Mohr

The efficacy of digital mental health interventions makes them ripe for use by practitioners and consumers in health care settings, but there remains a gap in understanding how to successfully implement these interventions. This paper proposes a compilation of implementation strategies specific to digital mental health interventions across different phases of implementation, to improve the integration of these tools into health care settings.

1093 Scaling Evidence-Based Treatments Through Digital Mental Health
Stephen M. Schueller and John Torous

The efficacy of digital mental health interventions makes them ripe for use by practitioners and consumers in health care settings, but there remains a gap in understanding how to successfully implement these interventions. This article proposes a compilation of implementation strategies specific to digital mental health interventions across different phases of implementation to improve the integration of these tools into health care settings.

Implementation Within Systems and Organizations

1105 Strengthening Capacity for Implementation of Evidence-Based Practices for Autism in Schools: The Roles of Implementation Climate, School Leadership, and Fidelity
Melina Melgarejo, Teresa Lind, Nicole A. Stadnick, Jonathan L. Helm, and Jill Locke

Understanding the factors that influence the use of evidence-based practices (EBPs) for autism spectrum disorder (ASD) in schools is critical to the selection of effective implementation strategies to support their sustained use. This article evaluates the association between school leadership profiles and fidelity of EBP implementation for students with ASD and examines the role of implementation climate as a mediator in this association.

1116 An Intervention Mapping Process to Increase Evidence-Based Psychotherapy Within a Complex Healthcare System
Chris Crowe, Claire Collie, Clara Johnson, and Shannon Wiltsey Stirman

Challenges to implementation and sustained use of evidence-based psychotherapies (EBPs) arise at multiple levels in complex mental health systems. The authors report on an intervention mapping process within the VA Healthcare system. Stakeholders in multiple roles used the process to make recommendations to address barriers and leverage strengths at the system, organization, clinic, therapist, and patient levels to increase reach and fidelity to EBPs.

1130 Aligning Dissemination and Implementation Science With Health Policies to Improve Children's Mental Health
Kimberly Eaton Hoagwood, Jonathan Purtle, Julia Spandorfer, Robin Peth-Pierce, and Sarah McCue Horwitz

Population-level impacts from dissemination and implementation (D&I) science on children's mental health are largely nonexistent. "Health in all policies" addresses familial, social, and economic factors affecting children's development. These kinds of health policy initiatives offer an opportunity to repurpose D&I science, shifting it from a focus on evidence-based practice implementation to policy development and implementation that supports child and family well-being.

Implementation Research and Evaluation in Community and International Settings

1146 A Hybrid Effectiveness/Implementation Trial of an Evidence-Based Intervention for HIV-Serodiscordant African American Couples
Gail E. Wyatt, Alison B. Hamilton, Tamra Burns Loeb, Nicholas J. Moss, Muyu Zhang, and Honghu Liu

Few community-based behavioral HIV prevention interventions exist for couples in the United States. Ninety-one individuals (45 living with HIV) participated in *Eban,* an intervention for heterosexual, African-American, HIV-serodiscordant couples. The effectiveness of the intervention was measured by condom use, and implementation was considered in relation to participants' housing, food, and transportation challenges as well as other vulnerabilities. The authors discuss the importance of patient-level factors in the process and outcomes of implementation research.

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1158 Listen, Don't Tell: Partnership and Adaptation to Implement Trauma-Focused Cognitive Behavioral Therapy in Low-Resourced Settings
Rosaura Orengo-Aguayo, Regan W. Stewart, Bianca T. Villalobos, Juventino Hernandez Rodriguez, Aubrey R. Dueweke, Michael A. de Arellano, and John Young

Youth in low-to-middle income countries are at significant risk of experiencing trauma-related mental health concerns and encountering the greatest barriers to accessing psychological services. This article describes efforts to implement Trauma-Focused Cognitive Behavioral Therapy (TF-CBT) for successful deployment in three, low-resource settings (rural South Carolina, Puerto Rico, and El Salvador). Findings highlight the importance of partnership and contextual adaptations for successful implementation in low-resourced settings.

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1175 Fernando González Rey (1949–2019)
Daniel Magalhães Goulart

1177 Gordon H. Bower (1932–2020)
John R. Anderson, Stephen M. Kosslyn, and Mark A. Gluck

1179 Dorothea Mary Ross (1923–2019)
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1180 Claire B. Kopp (1931–2019)
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On the cover: Optimism, *2020, by Russ Riendeau. Acrylic on canvas, 16 inches by 21 inches. Courtesy of the artist, https://www.russriendeau.com. See p. 1389 for more about Riendeau and his art.*

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APA Science Awards and Articles

1190 Award for Distinguished Scientific Contributions: Stephen P. Hinshaw

1193 Award for Distinguished Scientific Contributions: Elissa L. Newport

1196 Award for Distinguished Scientific Contributions: Lynn Nadel

1199 Award for Distinguished Scientific Contributions: John O'Keefe

1204 Award for Distinguished Scientific Applications of Psychology: Steven D. Hollon

1207 Is Cognitive Therapy Enduring or Antidepressant Medications Iatrogenic? Depression as an Evolved Adaptation
Steven D. Hollon
Depression may be an adaptation that evolved to serve a function such that any intervention that facilitates that function would be preferred over one that only anesthetizes the distress. Cognitive therapy cuts risk for subsequent relapse by more than half, whereas antidepressant medications may suppress symptoms in a manner that prolongs the underlying episode and leaves patients at elevated risk whenever they try to discontinue.

1222 Award for Distinguished Scientific Early Career Contributions to Psychology: Timothy F. Brady

1225 Award for Distinguished Scientific Early Career Contributions to Psychology: Ben Dantzer

1228 Award for Distinguished Scientific Early Career Contributions to Psychology: Katherine B. Ehrlich

1231 How Does the Social World Shape Health Across the Lifespan? Insights and New Directions
Katherine B. Ehrlich
Stressful life experiences in childhood have been linked to physical health across the lifespan. Increasing evidence points to several biological mechanisms that might explain how these stressors translate into health problems later in life. This article provides an overview of common study designs that are used to examine how social experiences shape health, and it concludes with several suggestions for future research.

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1242 Award for Distinguished Scientific Early Career Contributions to Psychology: Luke W. Hyde

1245 An Ecological Approach to Understanding the Developing Brain: Examples Linking Poverty, Parenting, Neighborhoods, and the Brain
Luke W. Hyde, Arianna M. Gard, Rachel C. Tomlinson, S. Alexandra Burt, Colter Mitchell, and Christopher S. Monk

Millions of youth grow up in poverty, exposing them to adversity, which impacts development. The authors describe an ecological approach to developmental neuroscience and describe how it is being used to identify the active ingredients through which poverty impacts brain development. To do so, the authors describe research elucidating the role of harsh parenting, neighborhood poverty, and their timing on brain function.

1260 Award for Distinguished Scientific Early Career Contributions to Psychology: Nazbanou Nozari

1263 Award for Distinguished Scientific Early Career Contributions to Psychology: Michael T. Treadway

1266 Award for Distinguished Scientific Early Career Contributions to Psychology: David S. Yeager

1269 What Can Be Learned From Growth Mindset Controversies?
David S. Yeager and Carol S. Dweck

A growth mindset is the belief that intellectual abilities can be developed, and this belief has been related to greater resilience. Recently, some scholars have argued that it is not harmful to believe that struggles mean that you can never improve your fixed low abilities, and they have argued that it is not helpful to teach people that academic abilities can be improved. The present paper reviews the evidence and explains how, why, and under what conditions a growth mindset can lead to improved educational outcomes.

APA Public Interest Awards and Articles

1286 Award for Distinguished Senior Career Contributions to Psychology in the Public Interest: Perry N. Halkitis

1289 A New Public Health Psychology to Mend the Chasm Between Public Health and Clinical Care
Perry N. Halkitis

Our healthcare system is failing many Americans, particularly members of marginalized groups who confront social and structural conditions that foster inequities. Neither public health nor clinical/medical care effectively address the psychosocial burdens that undermine health and well-being of people and populations. A modernized orientation of public health psychology offers a means to address the limitations in the delivery of both prevention and healthcare.

1297 Award for Distinguished Early Career Contributions to Psychology in the Public Interest: Valerie A. Earnshaw

1300 Stigma and Substance Use Disorders: A Clinical, Research, and Advocacy Agenda
Valerie A. Earnshaw

Stigma undermines efforts to prevent substance use and treat substance use disorders. Given their expertise in mental and behavioral health, psychologists are uniquely positioned to play a frontline role in addressing stigma within the current opioid epidemic as well as other substance use crises. This paper identifies ways that psychologists can address substance use disorder stigma through clinical care, research, and advocacy.

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1313 Award for Distinguished Contributions to Research in Public Policy: Gary L. Wells

1316 Psychological Science on Eyewitness Identification and Its Impact on Police Practices and Policies
Gary L. Wells
Research by psychologists has strongly shaped crime investigators' understanding, policies, and practices in collecting and interpreting eyewitness identification evidence. This article describes some key scientific findings and frameworks from psychology that have been applied to the problem of mistaken identification as well as forces (e.g., emergence of DNA-based exonerations involving mistaken identification) that have helped make the legal system receptive to the science.

APA Education Awards

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1334 APA/Psi Chi Edwin B. Newman Graduate Research Award: Andrew Young Choi

APA Practice Awards

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1343 Award for Distinguished Professional Contributions to Independent Practice: Adam S. Weissman

1347 Award for Distinguished Professional Contributions to Institutional Practice: Barry A. Hong

1351 APA/APAGS Award for Distinguished Graduate Student in Professional Psychology: Ana F. El-Behadli Gonzalez

APA International Awards and Articles

1355 Award for Distinguished Contributions to the International Advancement of Psychology: Sharon G. Horne

1358 The Challenges and Promises of Transnational LGBTQ Psychology: Somewhere Over and Under the Rainbow
Sharon G. Horne
Psychological science developed in WEIRD (Western, Educated, Industrialized, Rich, and Democratic) societies has contributed immensely to our understanding of LGBTQ+ experience and the lives of sexual and gender minorities, including to the advancement of LGBTQ+-related global human rights. This WEIRD-oriented lens, however, may reinforce a linear movement forward assumption, which shapes the focus and scope of LGBTQ+ psychology, and may overlook important developments in transnational LGBTQ+ psychological research and advocacy.

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1373 International Humanitarian Award: Niels Peter Rygaard

1376 Improving the Mental Health of Abandoned Children: Experiences From a Global Online Intervention
Niels Peter Rygaard

Digital solutions are needed more than ever. Since 2008 the author designed online educations and training programs in attachment-based care, improving the mental health of 40,000 children in foster and group homes worldwide. This article describes how partnerships with international researchers, non-governmental organizations, and government agencies can apply psychology interventions at a global scale, at low cost. Lessons learned are shared to inspire further blended learning developments.

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Think Alouds and Response Process Validity Evidence
Guest editor: Jonathan David Bostic

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ी लेख, शोध पत्र आदि का प्रकाशन करने से
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की नीतियों को प्रस्तुत नहीं करते, इसलिए इस

ार सुरक्षित है, परिषद् की पूर्व अनुमति के

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एवं बाल सुरक्षा, जेंडर स
जैसे अनेक मुद्दों पर विभि
आर्थिक एवं सामाजिक स
संगोष्ठी, सम्मेलन एवं प
जाती हैं। इन सभी प्रयासों
सार्थक समाधानों का संप्रेष
आवश्यक है। इस प्रकार के
पत्रिकाएँ भी होती हैं, *भारत*
यह अंक भी संप्रेषण का ए

पत्रिका के इस अंक
'*बरखा*' क्रमिक पुस्तक
पठन-निष्पादन — सीखने
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और प्रशिक्षण परिषद् (रा.
व 2 के बच्चों में पठन क
लिए विकसित की गई '*बर*
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सोच क्यों?' में बताया गय
की सोच ही उसका भवि

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एन सी ई आर टी
NCERT

भारतीय आधुनिक शिक्षा

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ावस्था में विकास, समकालीन
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शिक्षक शिक्षा हेतु आई.सी.टी.
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ा किया जाता है। लेखकों द्वारा
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राष्ट्रपिता की जयंती को 'स्व
लौह पुरुष की जयंती को 'रा
रूप में मनाया। इन महापुरुषों
एवं कल्याणकारी बनाने के
के संदेश, जैसे— शांति, सत
अखंडता आदि हमारी शिक्षा
ताकि हम सब लोग साथ मि
कर सकें। इसके लिए हमें सा
आवश्यकता है।

सभी को प्रारंभिक, माध
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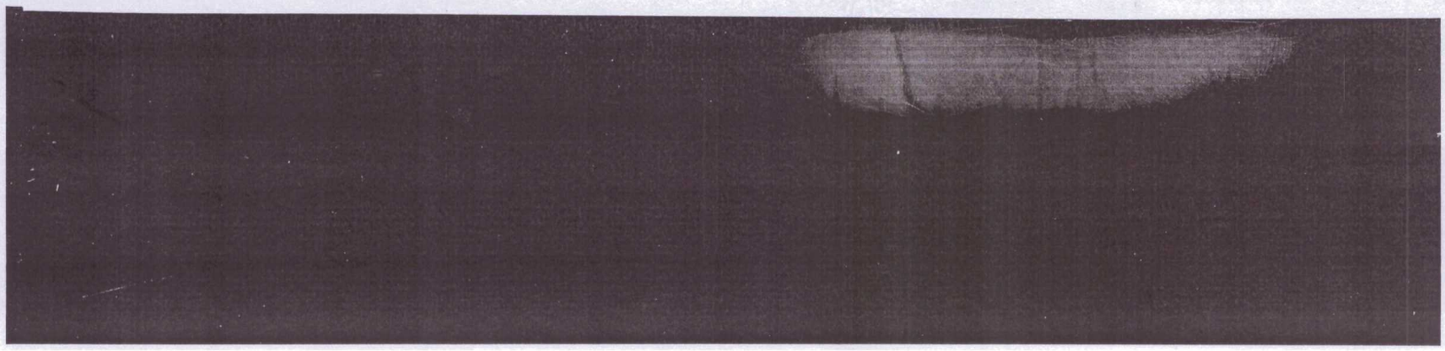

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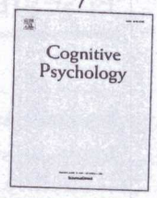

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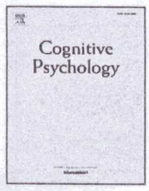

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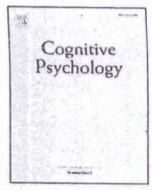

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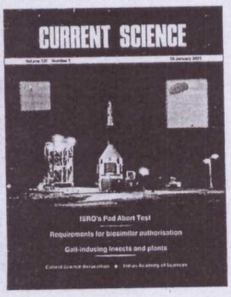

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The editor thanks Dr S. Somanath (Vikram Sarabhai Space Centre, Indian Space Research Organisation, Thiruvananthapuram), Dr S. Unnikrishnan Nair (Human Space Flight Centre, Indian Space Research Organisation, Bengaluru), Dr T. Sivamurugan and Dr S. L. N. Desikan (Vikram Sarabhai Space Centre, Indian Space Research Organisation, Thiruvananthapuram) for agreeing to be Guest Editors for special section.

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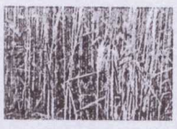

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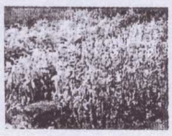

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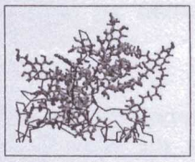

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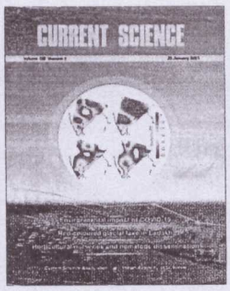

COVER. Artist's visualization of normal pre-lockdown anthropogenic environmental emissions (bottom background) and the clear skies (during lockdown). The centre-set shows the percentage reduction in the ambient concentrations of black carbon aerosols across Indian mainland during different phases of the lockdown as inferred from measurements. See page 341.

The editor thanks Dr K. Krishna Moorthy (Centre for Atmospheric and Oceanic Sciences, Indian Institute of Science, Bengaluru), Dr S. Suresh Babu (Space Physics Laboratory, Vikram Sarabhai Space Centre, Thiruvananthapuram), Dr B. V. Krishna Murthy (Chennai) and Dr J. Srinivasan (Centre for Atmospheric and Oceanic Sciences, IISc, Bengaluru) for agreeing to be Guest Editors for special section.

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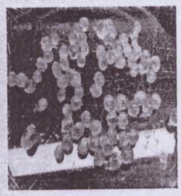

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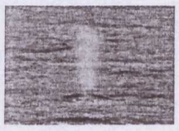

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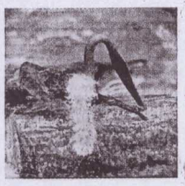

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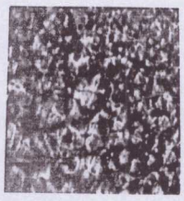

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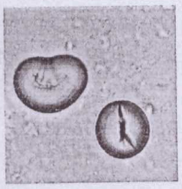

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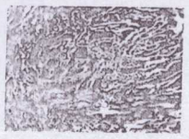

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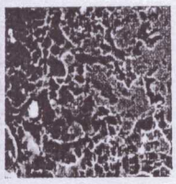

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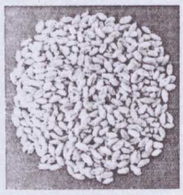

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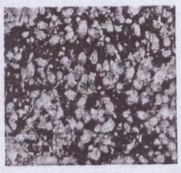

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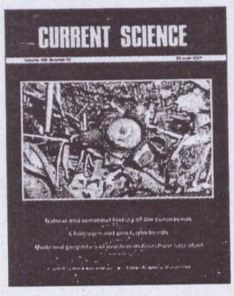

◀ COVER. Mushroom, *Geastrum saccatum* Fr. on the campus of Shri Shiv Chhatrapati College, Junnar. Photo: Ravindra D. Chaudhari. See page 1917.

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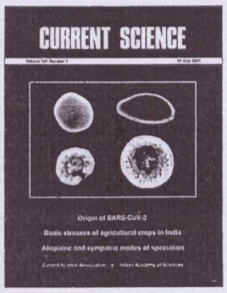

◀ COVER. A close-up image of coral species *Acropora cytherea* (Dana, 1846) releasing egg-sperm bundles (Top). Embedded collage (from left to right) showing fertilised egg, planula larva (free-swimming), and the attached larva (recruit) of day two, and day 7 of coral *A. cytherea*, cultured *in-vitro*, of the egg-sperm bundles collected during the mass spawning event at Kavaratti Island, Lakshadweep. See page 133.

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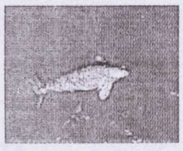

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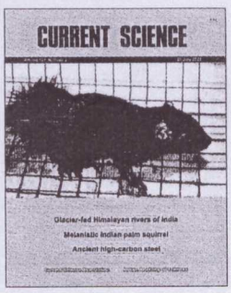

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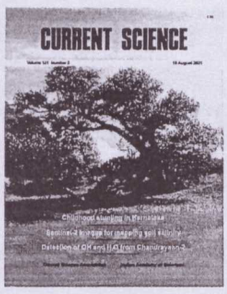

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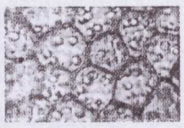

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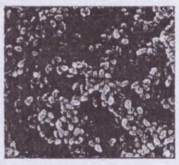

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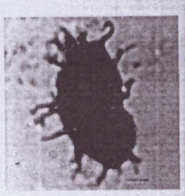

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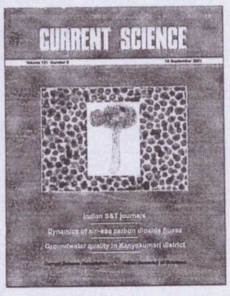

◀ COVER. A vegetatively propagating culture of *Wolffia microscopic* (Griff.) Kurz, clone number 5599 collected from Manouli, Haryana, India. Inset: A colony of *W. microscopic* clone 5599, with a mother frond undergoing both vegetative (budding of a daughter frond from the left) and generative (development and exposure of male and female floral organs on the dorsal surface) modes of reproduction. Photo by Klaus J. Appenroth and Jitendra P. Khurana, and inset by K. Sowjanya Sree. See page 724.

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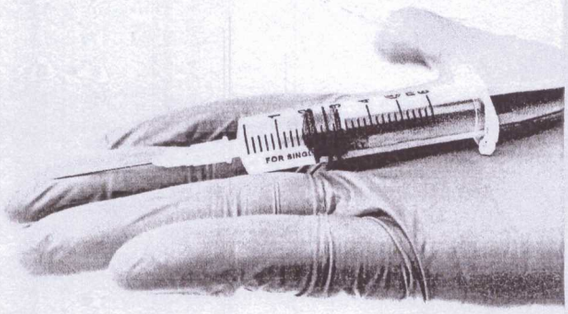

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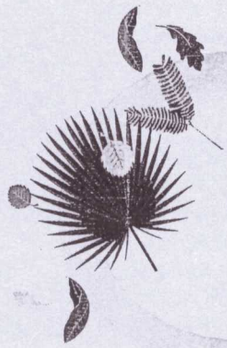

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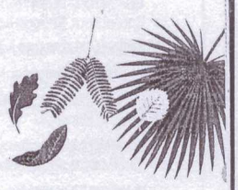

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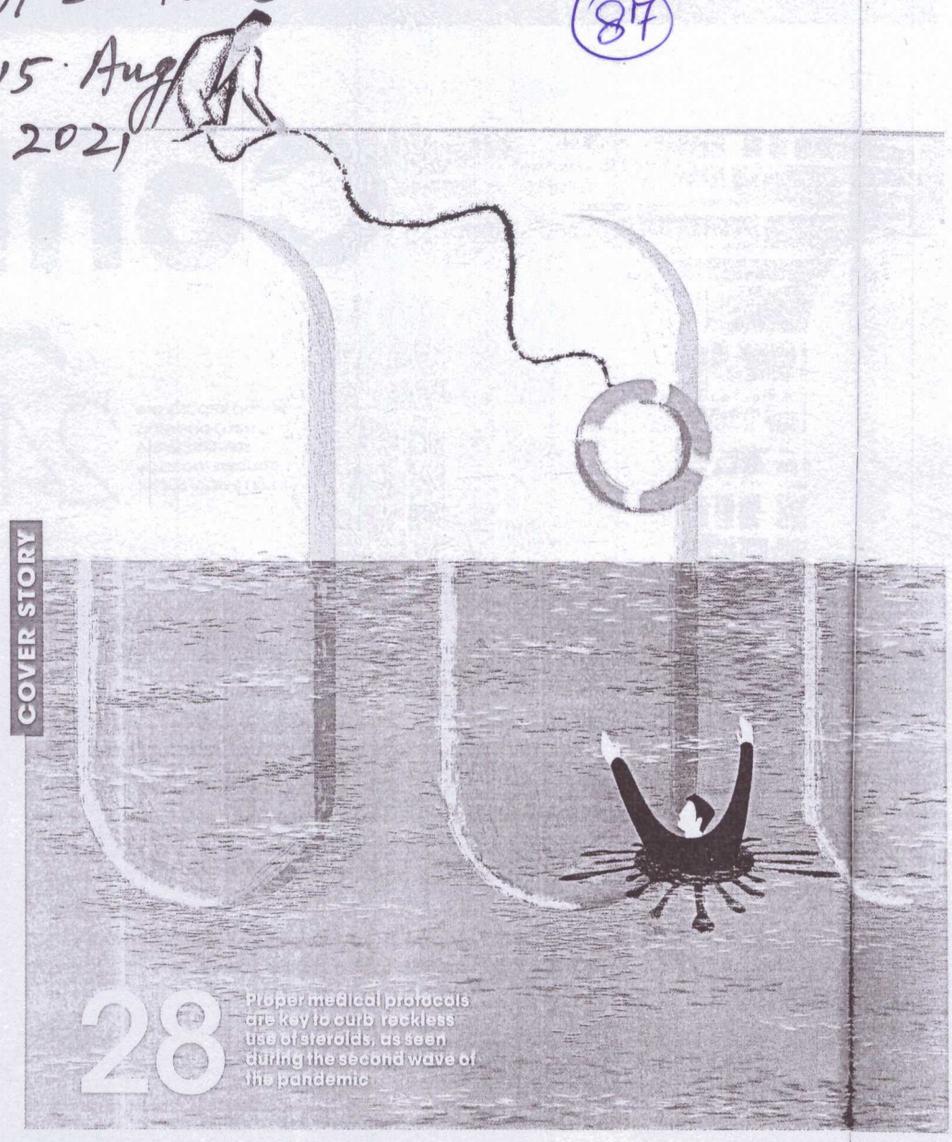

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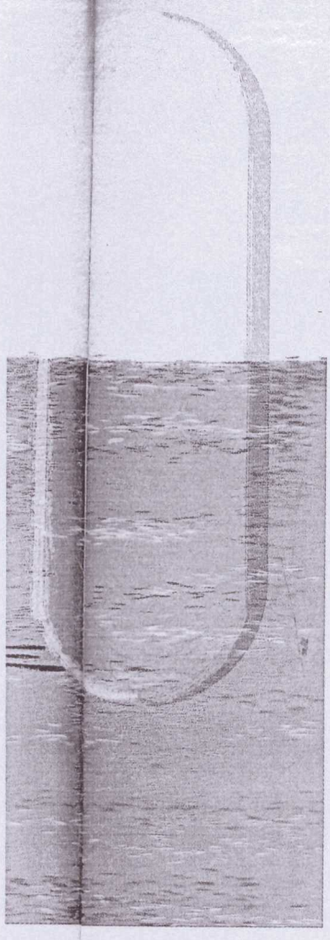



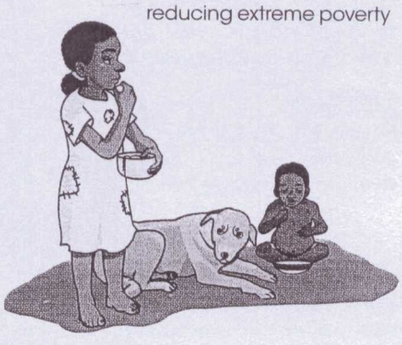

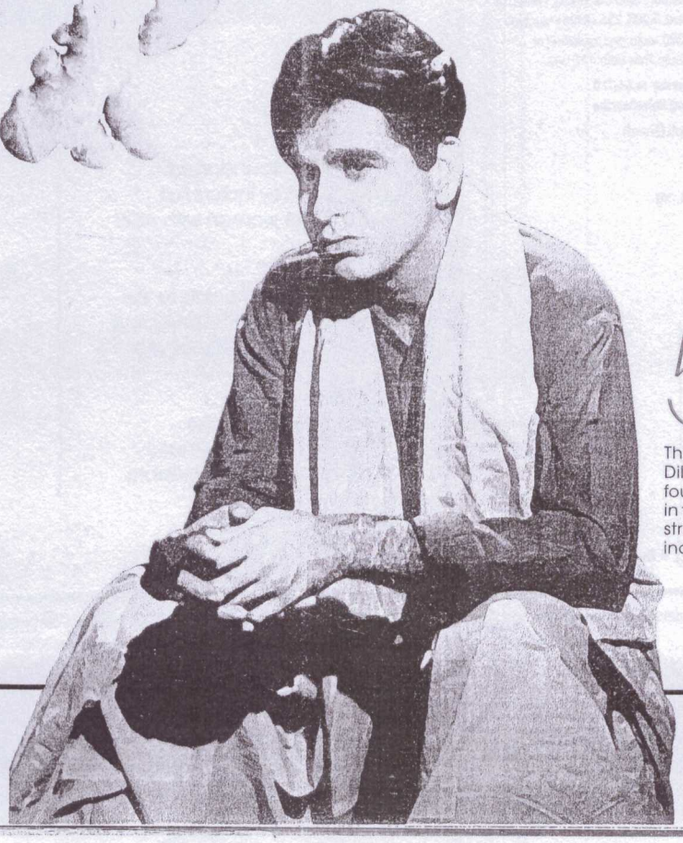

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Economic & Political WEEKLY

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Review of Rural Affairs

Five articles discuss interrelated themes concerning smallholder agriculture in India, such as the returns to farmers, efficiency, credit availability and the scale neutrality of credit from formal sources; the magnitude and burden of debt and the factors affecting indebtedness of farmers in Punjab; the responses to the farm laws amidst changing realities and the historical context of farmers' protests; technological change in agriculture brought about by the green revolution through the alienated subjective realities of a peasant in a Punjabi novel; the incidence and precarity of sharecropping practices in north Gujarat, and how they are mediated through cycles of debt and migration.

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10 According to conventional theories, when the realised and expected inflation rates are as high as they are in the United States, the long-term US Treasury yields should go up. — *T Sabri Öncü*

Just Transition in Coal: A Perspective from Jharkhand

13 The article discusses why it is an imperative for India to begin deliberation on a just transition from coal, based on an on-ground study of a coal district in Jharkhand. — *Chandra Bhushan, Srestha Banerjee & Shruti Agarwal*

Hindutva Hegemony and Future of Democratic Struggles

17 In the absence of any sustainable social solidarity between the struggling groups, it becomes easy for the right wing to retain its domination over electoral politics. — *Harish S Wankhede*

Migrant Workers from West Bengal since 1991

21 The article provides insights into labour migration, unemployment and economic growth during 1991–2018. — *Avijit Mistri*

Vaccinating a Nation in the Digital Divide

26 In the context of the need for universal vaccination, the limitations of the government's vaccination platform Co-WIN need to be analysed. — *Amber Sinha, Pallavi Bedi & Aman Nair*

Pradip Kumar Bose (1946–2021)

29 An engagement with Bose's ideas and work, while always incomplete, could be a sincere gesture of remembering him. — *Ritu Sen Chaudhuri*

Adherence to Pandemic Ethics

37 Adherence to pandemic ethics complements, regulates and refines public health emergency law enforcements. In this context, the article analyses the adherence of the countrywide lockdown to the existing principles of ethics. — *Nafis Faizi, Abhishek Royal*

Water and Agricultural Transformation in India—I

43 An argument for twin propositions is presented in this two-part paper: (i) that solving India's water problem requires a paradigm shift in agriculture (Part I), and (ii) that the crisis in Indian agriculture cannot be resolved without a paradigm shift in water management and governance (Part II). — *Mihir Shah, P S Vijayshankar & Francesca Harris*

Media Reportage of Sexual Violence

56 Current media reportage of sexual assault cases in India not only violates journalistic norms but also gravely impacts the victim's right to privacy. This paper argues that the law surrounding the identification of sexual assault victims must be amended to help better secure justice for victims, while also ensuring that their dignity is safeguarded. — *Megha Mehta, Mukta Joshi*

Re-envisioning *Experience, Caste, and the Everyday Social*—I

64 The attempt here is to think with, and systematically through, Gopal Guru and Sundar Sarukkai's ambitious work, *Experience, Caste, and the Everyday Social* (2019). Addressing the two configurations of thought underlying the work—namely the focus on "sensing" as central to the conceptualisation of the social and the idea of "the everyday social"—the paper tries to capture the movement of the text and the conceptual manoeuvres underscoring it. — *Sasheej Hegde, Peter Ronald deSouza*

Postscript

151 ***Snehashish Das*** on the time spent with Father Stan Swamy at Bagaicha, a community training centre that was started by the Jesuit priest and tribal rights activist; a poem by ***Chandramohan S***; and ***Bijaya Biswal*** on the everyday in the public healthcare system wherein patients are turned into statistics out of context.

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Economic&PoliticalWEEKLY

Democracy, Demographies and Population Policies

10 The two-child policy of the Uttar Pradesh government is looked at through precedents and similar past cases. — *Alok Prasanna Kumar*

The Role of Inequality and Growth in Determining Social Outcomes

13 The impact of inequality in hindering social outcomes is discussed. It is demonstrated that the apparent favourable association, which is counter-intuitive, between income inequality measures and social outcomes, is possibly due to both being associated with growth. — *Shiladitya Chatterjee*

The Politics of Medicine in a Pandemic

19 Medical pluralism or the coexistence of several systems of medicine in the public domain has attracted more attention than ever before in the context of the COVID-19 pandemic and also generated its fair share of controversies. — *V Sujatha*

The Uncertain Trajectory of Food Inflation

25 With the COVID-19 pandemic, the food inflation trajectory is faced with multipronged challenges. Given its inadvertent impact on the common people, adopting an efficient food supply management policy is quintessential. — *Aswathy Rachel Varghese*

Report of the Committee for Sub-national Accounts

28 An investigation on how the committee's recommendations will be useful for the impending revision of the base year for national accounts and state income estimates. — *Deepak Sethia*

Rules of Origin and Changes in the Customs Law and Procedures

31 The article highlights the growing use of concepts like country of origin and rules of origin in the domain of international trade and how they have become increasingly relevant to India. — *Amitesh Bharat Singh*

Is Democracy and Decentralisation the Answer for Lakshadweep?

40 Tensions are simmering in the union territory of Lakshadweep over a series of anti-people regulations issued by the present administrator but no one is discussing about the role of the deficit in democracy and decentralisation in the islands that led to the present crisis. — *Jos Chathukulam, Manasi Joseph*

Water and Agricultural Transformation in India: A Symbiotic Relationship—II

46 In this second part of the paper, the paradigm shift needed in water, which includes rejuvenation of catchment areas of rivers, a shift towards participatory approaches to water management, focus on green water and protective irrigation, and widespread adoption of water-saving seeds and technologies, while building transdisciplinarity and overcoming hydro-schizophrenia in water governance is discussed. — *Mihir Shah, P S Vijayshankar & Francesca Harris*

Sharing of Goods and Services Tax Revenues

52 The operation of the Integrated Goods and Services Tax Act, 2017 and the Goods and Services Tax (Compensation to States) Act, 2017 is examined to identify the distortions that have crept into this devolution channel. — *V Bhaskar*

Forking Paths: Re-envisioning *Experience, Caste, and the Everyday Social*—II

59 This part of the paper deals with the descriptive orientation of the text—*Experience, Caste and the Everyday Social*, that is consistent with its phenomenological thrust. — *Sasheej Hegde, Peter Ronald deSouza*

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COVID-19, Health Insurance and Access to Healthcare

10 Addressing the COVID-19 pandemic with a robust healthcare system is a more appropriate option than resorting to insurance. —*Ravi Duggal, Shailender Kumar Hooda*

Post-COVID-19 Paths to Fiscal Consolidation

13 In order to analyse how the excess of growth over the real interest rate can best contribute to Indian post-COVID-19 debt adjustment paths, the article draws on historical experience, past adjustment episodes and special features of emerging markets. — *Ashima Goyal*

The FPTC Act, 2020

19 In the name of empowering farmers, the Farmers' Produce Trade and Commerce (Promotion and Facilitation) Act, 2020 has displayed a blinkered vision of an integrated supply chain. — *Rajib Sutradhar*

Punjab's Draft Land Leasing Bill

23 The rationale behind Punjab's land leasing draft bill is examined from a smallholder/landless tenant's perspective, and implications for the lease land markets of Punjab are discussed. — *Sukhpal Singh*

Situating Caste Politics amidst the Ongoing Farmer Agitation

30 The history of local alliances forged between caste groups and the state is interrogated, through the colonial period leading to current-day west Uttar Pradesh. The recent farm acts threaten to supplant such alliances, with the state aligning with the interests of big capital. — *Vishal Singh Deo*

How Unstable Are the Sources of Livelihood?

36 This paper, based on the data from the annual Periodic Labour Force Survey, reflects on the lack of sustainable sources of livelihood and the phenomenon of multiple activities pursued simultaneously. — *Arup Mitra, Guru Prakash Singh & Puneet Kumar Shrivastav*

Environmental Accounting in India

46 The limitations of conventional income accounting, recent developments in environmental accounting at the international level, the progress and challenges of environmental accounting in India, and the way forward are discussed. — *Dasarathi Padhan, Amarendra Das*

Anglo-Indian Women Employed in Private Schools in Bengaluru

53 This paper examines the experiences of Anglo-Indian women teaching in Bengaluru's English medium private schools to understand how they negotiate professional constraints by drawing on Diane Reay's feminist extension of Pierre Bourdieu's "forms of capital." — *Jyothsna Belliappa, Sanchia deSouza*

Postscript

63 *Fayezah Iqbal* on reading the partition of India beyond a binary of emotions; *Rahulnath S R* on photojournalists who have documented the pandemic through severe social-distancing norms; *Sneha Annavarapu* on measuring diasporic distance in time; and Last Lines by *Ponnappa*.

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The National and the International in Ambedkar's Political Thought

10 Via an analysis of political sovereignty, the social question, and Buddhism, the article seeks to demonstrate how B R Ambedkar reworks the connections between the national and the international on the common register of human equality. — *Ankit Kawade, Antaripa Bharali*

Women, Priesthood and Religious Rights in Tamil Nadu and Kerala

15 In light of the recent announcement by the minister for Hindu religious and charitable endowments for Tamil Nadu, regarding the government's willingness to facilitate resources and training for women who wish to be priests in temples, the article examines the debates regarding the right of women to Hindu religious realm. — *Aparna Eswaran, Hameeda C K*

Preparing for a Just Transition Away from Coal

19 The dominance of coal for Indian energy security might, finally, be about to reduce as increasing demands are made for a just transition to cleaner and more community-friendly forms of energy. — *Patrik Oskarsson, Vasudha Chhotray*

Behind the Early Unravelling of Joe Biden's Promise

23 The unwillingness of the new United States administration under Joe Biden to usher in a new deal-like transformative policies, is due to the persistent control of the big business that is endemic to the sociopolitical systems of the capitalist West. — *Satyendra Ranjan*

Gandhi and the Re-enactment of Racism

32 Examining M K Gandhi's attitude towards South African natives during his sojourn in South Africa, Ashwin Desai and Goolam Vahed, in their book *The South African Gandhi*, have accused Gandhi of racism as he considered the natives racially inferior and called them Kaffirs. — *Radha Kumari*

Political Economy of BMC Budgets

68 The paper focuses on the changing trends in budget allocations of the Brihanmumbai Municipal Corporation, especially since the structural adjustment programme that came to be implemented from 1990 and how it has affected civic services, especially health and education. — *Ravi Duggal*

Is Ambedkar's Prejudice against 'Tribe' a Settled Matter?

78 A challenge is mounted against the widespread assumption that Ambedkar was prejudiced against "tribe," by revealing acts of academic carelessness that occur in the writings of some scholars through the cherry-picking of quotes and failure to historically contextualise the same. — *Nishikant Kolge*

Global Value Chains of MNCs and Indian SMEs: Promoting Linkages

86 The rapidly expanding global value chains of multinational corporations are increasingly dominating international trade, which emerging economies like India can hardly afford to ignore. — *M H Bala Subrahmanya, Muralidharan Loganathan*

Private Sector in Solid Waste Management

95 In most developing countries, waste is managed by government bodies who allocate a large amount of resources but rarely obtain the desired results. Taking this problem into account, this article explores the relationship between environmental policy and firms engaged in solid waste management by studying the case of four firms in the SWM industry in India. — *Rajiv V Shah, Samapti Guha*

A Hundred Years of Israeli Hyper-statehood

102 Drawing historical insights from Rashid Khalidi's acclaimed book, *The Hundred Years' War on Palestine: A History of Settler Colonialism and Resistance, 1917–2017*, this article suggests that the unease at Israeli hyper-statehood can only grow in the us and across the world. — *Amir Ali*

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Banking Sector Resilient in the Face of Pandemic

10 The Indian banking sector has been surprisingly resilient in the face of the pandemic because of the corporates. This bodes well for loan growth and bank performance post the pandemic. — *T T Ram Mohan*

Delhi's Quest to Universalise Food Security

12 The article discusses the lessons from the Delhi government's food relief efforts on universalising food security benefits. — *Eesha Kunduri, Shamindra Nath Roy & Shahana Sheikh*

Tax Reforms and Global Redistribution: Situating the Global South

16 The recent agreement on the "Two-Pillar Approach" that aims to tackle global corporate tax avoidance and taxing the digital economy falls short of addressing the priorities of the global South. — *Sakshi Rai*

Financial Inclusion through Urban Cooperative Banks in Telangana

20 While more than 60% of the Telangana urban cooperative banks are found to cater to slum dwellers and micro, small and medium enterprises, a clear gender gap is evident in terms of account ownership and access to credit. — *Mini P Thomas, Radhika Gupta*

Parliament amidst Pandemic: Situating the Opposition

28 Amidst the impasse over the working of Parliament how is the opposition–government relationship defined? — *Vikas Tripathi, Rupak Kumar*

Fifteenth Finance Commission

In the context of the uncertainties posed by the COVID-19 pandemic, six papers present key insights into the approach of the Fifteenth Finance Commission vis-à-vis the mandated task defined in the terms of reference.

Balancing Fiscal Need and Macroeconomic Stability

33 Given the macroeconomic uncertainties and rising fiscal needs, the Fifteenth Finance Commission focused on fiscal stability, equity and enhancement of fiscal space through higher borrowing. — *Pinaki Chakraborty*

Continuity with Change: Approach of the Fifteenth Finance Commission

40 The paper explores the structural shift in federal finances with the abolition of the Planning Commission and contemporaneous circumstances that shaped the approach of the Fifteenth Finance Commission. — *Ajay Narayan Jha*

Fiscal Consolidation and FRBM in the COVID-19 Context

48 The fiscal consolidation projections provided by the Fifteenth Finance Commission, including its alternative paths, have been rendered out of alignment because of the COVID-19's deleterious economic impact. — *D K Srivastava*

Fiscal Transfers in Pandemic Times

56 The phasing out of the revenue deficit grants to the states in the next five years is likely to pose challenges to the fiscally weak states. — *M Govinda Rao*

Mainstreaming Climate Change Commitments through Finance Commissions

62 This analysis suggests that climate change criterion in the intergovernmental fiscal transfer mechanism in India is a significant step to incentivise the conservation of forests. — *Lekha Chakraborty*

Fifteenth Finance Commission Award and the NES

69 The structural disabilities of north-eastern states necessitates that the union government supplements the expected finance commission transfers with other budgetary support. — *J Dennis Rajakumar*

Postscript

79 *Umang* on the idea that women can have the same interests in sport as men; *Mahashewta Bhattacharya* on how muttering relieves women, even if only momentarily, of the stress of caregiving and patriarchy; *Tara Brahme* on her Tamil; and Last Lines by *Ponnappa*.

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Looking Back at the Indo–Soviet Treaty

10 The significance of the Indo–Soviet Treaty of Peace, Friendship and Cooperation in its own time is explained along with the contemporary relevance of its underlying motives for a vision of a plural, multipolar world. *— Zorawar Daulet Singh*

Evaluation of PM KISAN vis-à-vis State Government Schemes

13 Features of various income support schemes are compared and the possibility of a collaboration between the central and state schemes is looked at. *— H N Kavitha, Pramod Kumar, P Anbukkani, R R Burman & P Prakash*

Regulation of Cryptocurrency: An Indian Perspective

18 This article attempts to delve into the concept of cryptocurrency and the issues and challenges they face along with offering suggestions for their better regulation. *— Sunitha Abhay Jain*

India–Gulf Labour Migration in the Aftermath of COVID-19

22 Delineation of some of the major policy interventions that merit immediate attention to make the migration policy architecture "migrant-centric." *— S K Sasikumar*

Nobel in Auction

27 Auction designs end up helping private and public players to make a valuation of a public good and, hence, create a market that did not exist beforehand, which, quite often, overlooks the underlying social and environmental concerns. *— Atanu Sengupta, Anirban Hazra*

Sustaining the Sustainable Development Goals

30 This article critiques the framework used for assessing the progress of the Sustainable Development Goals and their comparison across states. *— Udaya S Mishra, Balakrushna Padhi*

Labour 'Invisibility' during COVID-19 Times

37 An examination of the "invisibility" of the migrant labour to Indian policymakers as the migrant labour exodus unfolded through the summer of 2020 *— Veena Naregal*

Did Employment Rise or Fall in India between 2011 and 2017?

44 This paper shows that some of the variations in estimates of the Periodic Labour Force Survey 2017–18 can be attributed to how populations are projected based on data from Census 2011. *— Paaritosh Nath, Amit Basole*

Constitutional Asymmetry in Federalism: Union Territory Model

53 An attempt is made to locate union territories as a distinct unit of the Indian federation in the context of asymmetrical federalism, and their status is examined through the principle of weighted and differentiated equality in India. *— Rekha Saxena*

The Inconvenient Truth of Illiteracy Inequality

61 This study analyses adult illiteracy in Lucknow, focusing on inequalities between different geographical regions, castes, age groups and genders. *— Sunita Gandhi, Kaaren Mathias, Linda Seefeldt & Thomas Delaney*

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Contextualising 'Wages for Housework' for Indian Society and Digitalising Economy

10 The historical trajectory of "wages for housework" is traced along with situating it in the Indian set-up and the digitalising economy. Its implications on the feminist movement in the country are also discussed. — *Khawla Zainab*

Biofortification: Associated Costs and Alternatives?

13 It is argued that biofortification may not be an effective weapon to fight against hidden hunger since it demonstrates limited capacity for nutritional enhancement and suggests alternatives. — *Avik Ray*

New IT Rules, 2021

16 On the one hand, these rules will be a measure that will weaken the right to privacy, and on the other, there will be extensive surveillance by the executive over content. — *Radhika Krishnan*

COVID-19 and IPR Waiver: An Indian Perspective

19 A more effective approach than IPR waivers for COVID-19 vaccines is to use compulsory licences, and reduce tariffs and non-tariff measures. — *Nilanjan Banik, Debashis Chakraborty*

Two-child Norm: Curtailing Welfare, Weaponising Demography

23 The draft of the Uttar Pradesh Population (Control, Stabilisation and Welfare) Bill, 2021 will adversely affect welfare state mechanisms and long-term demographic transition. — *Mohan Rao, Aprajita Sarcar*

Why Should the Marital Rape Exception be Removed?

33 Redundant arguments like irrevocable consent for sexual intercourse and ensuring sanctity of marriage cannot be used to retain the marital rape exception. — *Ayushi Agarwal*

Dividend Behaviour of Indian Companies post Macroeconomic Policy Shock

38 The impact of the macroeconomic shock of demonetisation in 2016 on the dividend payout policy of Indian companies is examined, and it is suggested that major macroeconomic shocks affect the dividend payout decisions of companies. — *Ramesh Bhat, I M Pandey, Samveg Patel*

Impact of Leverage on Firms' Investment: Decoding the Indian Experience

44 A firm's leverage adversely affects its investment activity after a threshold. The initiatives to clean up the balance sheets of banks and deleveraging by non-financial corporates should help in the revival of the investment cycle. — *Avdhesh Kumar Shukla, Tara Shankar Shaw*

'Bourgeois View': Space in Assamese Literature, 1910s–1950s

54 How, between the late 19th century and the first half of the 20th century, the bourgeoisie in Assam conceived and represented space? The discussion is based on Lakshminath Bezbaroa's play "Jaymati" (1915) and Rasna (Birinchi) Barua's (1959) novel *Seuji Patar Kahini* (The Story of the Green Leaves). — *Manjeet Baruah*

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Education, Assimilation and Cultural Marginalisation of Tribes in India

10 The cultural marginalisation of the tribal people in India is discussed by drawing parallels with the residential school system that existed in the United States and Canada. — *Virginius Xaxa*

Making Digital Financial Inclusion a Reality

14 A road map for digital financial inclusion in India using the framework based on the eight high-level principles of G-20 nations. — *Maram Srikanth, K S Ranjani & Veneet J Kalloor*

Infant Mortality Rate: Do Indian States Converge?

18 An attempt aims to understand the underlying improvement in the infant mortality rate at the state level by using health inequality measures like standard deviation, coefficient of variation, rate of improvement differences, β convergence and Gini coefficient. — *Vishalkumar Jani*

Gail Omvedt (1941–2021): A Scholar Activist, an Activist Scholar

21 The journey of Gail Omvedt's scholarship and activism is traced wherein she combined the two, which distinguished her the most. — *Surinder S Jodhka*

Public–Private Partnerships in Healthcare: Evidence from India

29 A detailed study of the formulation and performance of specific public–private partnerships in the healthcare sector in Bihar, Chhattisgarh and Delhi reveals that PPPs faced challenges similar to the government health system. — *Sulakshana Nandi, Vandana Prasad, Deepika Joshi, Indira Chakravarthi, Ganapathy Murugan, Shahnawaz Khan, Mohammed Allam Ashraf, Pallavi Gupta & Chandan Kumar*

State Policy and Recruitment of Domestic Workers and Nurses to West Asia

37 An analysis of the comparative political economy of overseas recruitment policy towards nurses and women domestic workers by examining the disproportionate influence of specific interest groups. — *Praveena Kodoth*

How Indian Courts Value Unpaid Domestic Work

45 A look at tort law, namely a review of compensation awarded to the dependents of homemakers, between 1968 and 2019, under the Indian Motor Vehicles Act, 1988, thereby discussing the role of law in reinforcing the invisibility of unpaid domestic and care work. — *Prabha Kotiswaran*

Horticulture Diversification Key to Development Role of Small and Marginal Farmers

53 The trend of growth in horticulture, along with the underlying value of output from the sector, is analysed along with using regression analysis, and a direct correlation between farm size and income levels to understand the relationship between the small and marginal farmers and the diversification in agriculture. — *Bakhtaver Hassan, Mahua Bhattacharjee & Shabir A Wani*

Distribution of Landholdings in Rural India, 1982 to 2013

60 How has the concentration of land, both owned and operated, changed over time? At what level of hierarchy has the concentration of owned and operated land tended to become more pronounced? These are some of the questions that are examined here. — *H R Sharma, S H Malik*

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7 Recognising social and political fissures amidst a call for unity is essential.

Lessons from Sri Lanka

8 Ethnocracy and concentration of power can derail even an affluent nation.

Asset Monetisation for Infrastructural Investment

10 The downside of the National Democratic Alliance government's enthusiastically introduced asset monetisation plan is discussed. *— C P Chandrasekhar*

Provision and Access of Public Goods in an Indian Village

12 A micro-ethnographic study unravels the patterns of public goods segregation and access in a village. *— Gopinath Annadurai*

Status of Women's Reproductive Health in Bihar

17 The precarious sexual and reproductive health of women in Bihar is depicted through the National Family Health Survey data for 2015–16 and 2019–20. *— Tripti Kumari, Santosh Verma*

Problematic Amendments to the Central Civil Services Pension Rules

21 In order to remove the impression of India being a "surveillance state," revisisting the 2008 and 2021 orders by the respective union governments amending the Central Civil Services (Pension) Rules becomes crucial. *— Vappala Balachandran*

Utilisation of Government Borrowings in Major Indian States

30 Subnational fiscal sustainability is analysed through a study of utilisation patterns of total debt receipts of state governments during 1980–81 to 2014–15. *— Amanpreet Kaur*

Integration of Health Services for Older Persons in Urban India

36 A review of the available literature on integrated care for older persons in the urban context in India with an understanding of the gaps therein along with policy recommendations *— Rama Baru, Madhurima Nundy, Ramila Bisht, C U Thresia & Jyotishmita Sarma*

India's Sugar Woes at the World Trade Organization

44 Policies related to India's sugar sector are facing adjudication in a case brought to the World Trade Organization; these are critically analysed here. *— Sachin Kumar Sharma, Adeet Dobhal & Saiya Savooji*

A Study of the Sualkuchi Silk Handloom Cluster in Assam

52 Focusing on the living and working conditions of artisan labour in the silk-weaving cluster of Sualkuchi in Assam, the paper explores the conditions of reproduction of informal enterprises. The significance of a non-capitalist institutional arrangement in the contemporary scenario of the handloom sector is brought out. *— Anamika Das, Deepak K Mishra*

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63 ***Mrinmoy Pramanick*** on finding an almost 100-year-old narrative of personal history while preparing for an academic talk; ***Disha Ray*** on changing social imagination and OTT platforms; a poem by ***Priyanka Sacheti***; and Last Lines by ***Ponnappa***.

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A Feminist Interrogation of the POCSO Judgments and Criminal Law in India

10 This article argues that the recent Protection of Children from Sexual Offences Act judgments cannot be studied in isolation from the larger paradigm of feminist critique of law and engagement with law in India. — *Atreyee Sengupta*

Nine Years of Turmoil in Taxation

13 In 2012, the finance ministry of the Government of India amended the Income Tax Act to tax capital gains from indirect corporate transactions. Despite the altered legal position that this law will apply prospectively instead of retrospectively, the woes of the ministry are not over. — *K L Datta*

Using Public Procurement Strategically

16 The article examines policy decisions and practices in public procurement in India during the pandemic, and finds that bureaucracy could not use it strategically. Some lessons from China's procurement designs are also offered. — *Yugank Goyal*

Plantation Workers and the OSHWC Code, 2020

20 Welfare provisions for plantation workers in the Occupational Safety, Health and Working Conditions Code, 2020 are subject to how respective state governments frame rules and can have wide variations too. There is a need to recognise the use of technology in ensuring better occupational safety. — *Kingshuk Sarkar, Vinit Ghosh*

District-level Estimates of Unemployment Rates in Odisha

23 This article describes the possibilities of using an alternative method, such as small area estimation, for generating district-level unemployment estimates with higher precision combining the Periodic Labour Force Survey 2018–19 data and the auxiliary variables from other secondary data sources. — *Khan M F, Hukum Chandra, B N Mohanty & Sridhar Sahoo*

Deprivation and State Response in Maharashtra

33 The article maps and analyses the impact of the first wave of the COVID-19 pandemic and the subsequent lockdown in Maharashtra based on the three dimensions of human development—health and nutrition, education, and livelihood. — *Chandrika Singh, Shoumeli Das, Anuradha Nair*

Drivers of Foodgrain Productivity in Uttar Pradesh

40 The study uses district-wise panel data for the period between 2000–01 and 2016–17 and thereby assesses trends and acceleration or deceleration of growth in area, production and productivity of foodgrains in Uttar Pradesh. — *Priyanka Singh, Mini Goyal & Bishwa Bhaskar Choudhary*

Elected Representatives and Local Bureaucracy Interface in West Bengal

46 Based on the long-term ethnographic research in four districts during a political transition in West Bengal and analysing narratives of disagreements between elected representatives and local bureaucrats in their gram panchayats, it is argued that the interface between the elected members and the bureaucracy is dialectical and is influenced by external as well as local contexts. — *Suman Nath, Bhaskar Chakrabarti*

Why Human Development Should Precede Economic Growth in the States

54 The paper presents a conceptual model of the relationship between human development and growth and between them and poverty. It then empirically tests the model. — *Santosh Mehrotra, Jajati Keshari Parida*

Utilisation of Public Healthcare Facilities: Have They Improved?

62 A response to an earlier article which claims that there has been a significant increase in the utilisation of public healthcare facilities by the poor and a reduction in out-of-pocket expenses in healthcare, along with cautioning on methodological issues and the possible errors of interpretation in the earlier article. — *T R Dilip, Narayanan Devadasan & Sunil Nandraj*

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Guest Editors: Sal Consoli and Kenan Dikilitaş

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EDITORIAL

Dear Reader,

Namaskar! These have been terrifying times. As we struggle to get our feet back on the ground after the second wave of the Covid tsunami, we are warned of the third wave. We brace ourselves, and carry on. As a nation, as a people, we have been unbelievably resilient, trudging grimly, determinedly through the flood of loss and daily deaths. But our worlds have shrunk and lost colour, we are withdrawing into smaller spaces, seeking safety away from others, we are increasingly retreating into ourselves.

Lockdowns in Delhi and across the country have played havoc with our daily lives. And schedules. So apologies for the delay in your receiving this journal.

In this issue, *Indian Literature* pays tribute to some of the distinguished Indian littérateurs we lost recently, three of them to Covid – Sankha Ghosh in Kolkata, Shamsur Rahman Faruqi in Allahabad, and Rahat Indori in Indore. We also remember Ved Mehta and Chandranath Mishra 'Amar' who passed away in New York and Darbhanga respectively. Even this *anjali*, this palmful of mourning, gives us a glimpse of the diversity of our literatures and authors – in language, passion, style and reach. And how they often felt the same way about what matters in life. "Get in the habit of waking up and awakening the other," said Rahat Indori. Said Sankha Ghosh, "Just staying awake is also a religious duty."

We have been kept achingly awake by artist Nilima Sheikh and poet, artist and art historian Gulammohammed Sheikh through their art in the time of Corona. A closer look at this issue's covers will tell you how.

And in her essay on the world grappling with Covid, Mridula Garg finds parallels with the Spanish flu that ravaged the world, particularly India, more than a hundred years ago. She quotes from a sanitary commissioner's notes: 'The streets and lanes of the cities were littered with dead and dying people… nearly every household was lamenting a death, and everywhere terror and confusion reigned.' Sounds eerily familiar today.

As we see in Damodar Mauzo's haunting Konkani story 'Whose corpse is that?' Shrinking from the terror of the touch in Covid times, villagers ask, 'Who does this corpse belong to?' The author wonders, 'How can a corpse belong to anyone, anyway?' Crematorium smoke winds its way through the

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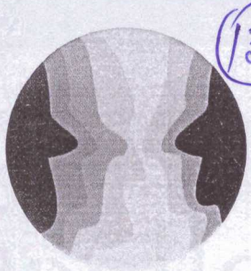

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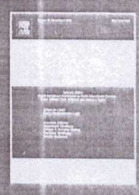

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Special Issue: New Approaches to Exploring Processes of Change in Counseling Psychology
Guest Special Issue Editors: Sigal Zilcha-Mano and Fabian T. Ramseyer

409 Innovative Approaches to Exploring Processes of Change in Counseling Psychology: Insights and Principles for Future Research
Sigal Zilcha-Mano and Fabian T. Ramseyer

In recent years, innovative approaches to capturing the process of change, as it unfolds from one moment to the next, have been implemented in counseling and psychotherapy. This special issue contains articles from scholars around the world, each one focusing on a promising approach, and provides instructive information on how to implement the approaches in counseling and psychotherapy and how to interpret the collected data to advance our understanding of both processes and outcomes. This introductory article describes a set of guidelines that can help elucidate the differences and similarities between the approaches and facilitate their implementation in counseling and psychotherapy research.

420 Physiological Synchronization in the Clinical Process: A Research Primer
Johann R. Kleinbub, Alessandro Talia, and Arianna Palmieri

Physiological synchronization is the study of simultaneous changes in patients' and therapists' physiological activity. Physiological synchronization has been associated with empathy, attachment, and positive therapeutic relationship, and although still in its infancy, the research field promises to pave the way for objective and fine-grained assessment of various therapy processes. In this article we provide an overview of existing literature and practical guidelines for researchers and clinician interested in the approach.

438 Machine Learning and Natural Language Processing in Psychotherapy Research: Alliance as Example Use Case
Simon B. Goldberg, Nikolaos Flemotomos, Victor R. Martinez, Michael J. Tanana, Patty B. Kuo, Brian T. Pace, Jennifer L. Villatte, Panayiotis G. Georgiou, Jake Van Epps, Zac E. Imel, Shrikanth S. Narayanan, and David C. Atkins

Our study suggests that client-rated therapeutic alliance can be predicted using session content through machine learning models, albeit modestly.

449 Patterns of Early Change in Interpersonal Problems and Their Relationship to Nonverbal Synchrony and Multidimensional Outcome
Wolfgang Lutz, Jessica N. Prinz, Brian Schwartz, Jane Paulick, Desiree Schoenherr, Anne-Katharina Deisenhofer, Patrick Terhürne, Kaitlyn Boyle, Uwe Altmann, Bernhard Strauß, Eshkol Rafaeli, Dana Atzil-Slonim, Eran Bar-Kalifa, and Julian Rubel

This study suggests that lower levels of nonverbal synchrony may be a predictor of early improvement in interpersonal problems, which furthermore predict treatment outcome in symptoms and interpersonal problems. Given further research, nonverbal synchrony might become a useful addition to monitor successful treatment processes.

(*Contents continue*)

462 Feasibility and Acceptability of a Novel Tool for the Study of Interpersonal Processes in Psychotherapy
Carly M. Schwartzman, Brittany R. King, Anna-Kaisa Newheiser, Jennifer M. Oswald, Matteo Bugatti, Elijah Cedeno, and James F. Boswell
This article examines a novel sensing device with the capability to measure dyadic interpersonal process variables in real-time and in ecologically valid settings. By quantifying tangible therapy processes, wearable sensing devices have potential for investigating in-session behaviors and guiding clinical practice.

475 What Can Be Learned From Couple Research: Examining Emotional Co-Regulation Processes in Face-to-Face Interactions
Peter Hilpert, Timothy R. Brick, Christoph Flückiger, Matthew J. Vowels, Eva Ceulemans, Peter Kuppens, and Laura Sels
The current tutorial presents a method (i) to assess continuous emotions retrospectively and (ii) to examine dynamic emotion regulation processes between patients and therapists during psychotherapy sessions. Such a method gives clients an explicit voice at a moment-to-moment level, allows future research to examine novel research questions, can be used as an educational tool for therapy trainings, and has the potential to enhance our understanding of psychotherapeutic treatments when combined with computational systems that can recognize, interpret, and process human emotions (i.e., affective computing).

488 Incorporating Physiology Into the Study of Psychotherapy Process
Carlene Deits-Lebehn, Katherine J. W. Baucom, Alexander O. Crenshaw, Timothy W. Smith, and Brian R. W. Baucom
Understanding clients' physiological activity during psychotherapy has the potential to provide unique insights into how and why therapy works. Incorporating these methods into therapy process research requires both conceptual and methodological expertise. This article provides therapy process researchers with a conceptual foundation for thinking about how to incorporate physiology into their research and a methodological foundation for beginning to develop their own expertise or initiate a productive collaboration with a physiological expert.

500 Using Event-Related Potentials to Explore Processes of Change in Counseling Psychology
Julie Matsen, Kristin Perrone-McGovern, and Cheri Marmarosh
This article provides a guide for employing event-related potentials in the study of psychotherapy change processes within the field of counseling psychology. A conceptual overview of the method, current implementations and uses, and implications for the future of the field are discussed.

509 Language Style Matching in Psychotherapy: An Implicit Aspect of Alliance
Katie Aafjes-van Doorn, John Porcerelli, and Lena Christine Müller-Frommeyer
Language style matching may offer unique opportunities for the examination of therapist–client interactions within and between sessions, particularly those implicit aspects which elude conscious awareness of the therapist, client, or outside observer, that nonetheless exert an influence on treatment outcome.

523 Oxytocin as a Biomarker of the Formation of Therapeutic Alliance in Psychotherapy and Counseling Psychology
Sigal Zilcha-Mano, Simone Shamay-Tsoory, Tohar Dolev-Amit, Orna Zagoory-Sharon, and Ruth Feldman
The article highlights the promising potential of OT as a biomarker in psychotherapy research, through the most recent research on the role of OT in parent–child and romantic relationships, as well as through data from a randomized controlled trial of psychotherapy for major depressive disorder. The article provides practical suggestions on how this potential may be realized. Interdisciplinary studies integrating the two fields of inquiry, psychotherapy and OT research, can create new important knowledge that has the potential to make a substantial contribution to clinical practice and complement existing approaches for measuring the process of therapeutic change.

158

536 Motion Energy Analysis (MEA): A Primer on the Assessment of Motion From Video
Fabian T. Ramseyer

An objective, computer-based tool for the assessment of nonverbal behavior shown by dyads in counseling and psychotherapy is presented. Motion energy analysis (MEA) automatically quantifies movement dynamics shown by patients and therapists during their verbal interaction. This aspect of nonverbal behavior provides valuable information on specific characteristics of the therapeutic relationship and other facets of the therapy process. The practical use of MEA is illustrated in a sample of psychotherapy intake interviews.

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Articles

551 Conscience Clauses and Sexual and Gender Minority Mental Health Care: A Case Study
Patrick R. Grzanka, Elliott N. DeVore, Keri A. Frantell, Joseph R. Miles, and Elliot S. Spengler
This study explores the consequences of a law in Tennessee that may legalize discrimination in therapy. The authors elaborate how "conscience clauses" may discourage members of vulnerable groups from seeking therapy, which may exacerbate the effects of social stigma on individual mental health.

568 A Cross-Cultural Comparison of Psychology of Working Theory Among U.S. and Korean College Students
Haram J. Kim, Shin Ye Kim, Ryan D. Duffy, Nguyen P. Nguyen, and Danni Wang
This study examined predictors of occupational engagement and future perceptions of decent work among undergraduate samples from the United States and Korea. Although psychological factors such as the perceived ability to freely make career choice and the resources to cope with various career tasks were important for both sample, notable differences existed concerning the links between economic resources to career-related behaviors and perceptions of future work.

580 Intrapersonal and Interpersonal Emotional Networks and Their Associations With Treatment Outcome
Eran Bar-Kalifa and Dana Atzil-Slonim
The findings of this study suggest that emotional dynamics within the client as well as between the client and the therapist are associated with treatment outcome. Specifically, clients who responded to treatment showed greater emotional flexibility from session to session; additionally, their emotions were more intertwined with those of their therapists.

595 The Suicide Crisis Syndrome: A Network Analysis
Sarah Bloch-Elkouby, Bernard Gorman, Allison Schuck, Shira Barzilay, Raffaella Calati, Lisa J. Cohen, Ferhana Begum, and Igor Galynker
This study suggests that the mental processes experienced by individuals who present with the suicide crisis syndrome co-occur and may cocreate or reinforce each other and that most of them may feed from and to the sense of being entrapped with no viable future life options.

608 Follow You or Follow Me? Examining Therapist Responsiveness to Client and Responsiveness to Self, Using Differential Equations Model and Multilevel Data Disaggregation From an Interpersonal Theory Framework
Xu Li, Dennis M. Kivlighan Jr., and Clara E. Hill
This study suggests that in the first therapy session, the therapist may benefit from (a) not going along with the client's lead all the time, and using some mildly dominant probing questions to facilitate deeper or broader exploration, and (b) withholding from client's interpersonal pull to be more directive when client is passive/submissive, and remaining a nondominant stance to provide space for the client to take lead.

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Articles

653 From Pain to Power: An Exploration of Activism, the #MeToo Movement, and Healing From Sexual Assault Trauma
Charlotte Strauss Swanson and Dawn M. Szymanski

Our findings indicate that involvement in anti–sexual assault activism and connection to larger scale antiviolence activist movements can play an important role in sexual assault survivors' healing process and posttraumatic growth. However, activism also brings challenges that survivors need to be prepared for, such as being triggered, burning out, and feeling disillusioned and frustrated.

669 Decent and Meaningful Work: A Longitudinal Study
Blake A. Allan, Kelsey L. Autin, Ryan D. Duffy, and Haley M. Sterling

This longitudinal study examined factors that make work meaningful. We found that having decent work predicted greater meaningful work and that community belonging and helping others may explain this relation.

680 Meta-Analytic Path Analysis of the Social Cognitive Well-Being Model: Applicability Across Life Domain, Gender, Race/Ethnicity, and Nationality
Hung-Bin Sheu, Robert W. Lent, Angela M. Lui, Xiao Ting Wang, Laura Phrasavath, Hyun-Jin Cho, and Taylor R. Morris

This meta-analytic study examined factors hypothesized to predict individuals' well-being. Findings demonstrate that the social–cognitive well-being model and a culture-modified version, which includes independent/individualistic and interdependent/collectivistic cultural orientations, offer a useful approach to understanding the experience and pursuit of well-being across life domains, gender, racial/ethnic groups, and participants in the U.S. and other countries. Results also identify group differences that may be relevant to practice.

697 A Follow-Up of Undergraduate Students Five Years After Helping Skills Training
Clara E. Hill, Timothy Anderson, Judith A. Gerstenblith, Kathryn V. Kline, Caroline V. Gooch, and Anna Melnick

Participants reported that they used the helping skills in both their professional and personal lives 5 years after training, suggesting that the effects of helping skills training extend over time. Furthermore, those who pursued further mental health education continued to improve in their helping abilities more than did those who did not continue further mental health education.

706 Assessing the Alliance–Outcome Association Adjusted for Patient Characteristics and Treatment Processes: A Meta-Analytic Summary of Direct Comparisons
Christoph Flückiger, A. C. Del Re, Daniel Wlodasch, Adam O. Horvath, Nili Solomonov, and Bruce E. Wampold

The alliance is a robust predictor of outcome at the between-patients level. Patients who report a stronger alliance during treatment are also likely to report better treatment outcome. This association remains significant when controlling for patients' intake characteristics and therapists' adherence and competence. These results demonstrate that the alliance is an independent process-based factor with unique contribution to outcome across many psychotherapeutic contexts.

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622 Development and Evaluation of a New Short Form of the Conformity to Masculine Norms Inventory (CMNI-30)
Ronald F. Levant, Ryon McDermott, Mike C. Parent, Nuha Alshabani, James R. Mahalik, and Joseph H. Hammer
This study provides a meaningfully shorter version of the Conformity to Masculine Norms Inventory that preserves the variability of the original measure, confirms that the measure is best used in examinations of specific masculinity norms, and offers evidence that White men and men of color understand the scale scores in the same way. In addition, this study provides preliminary validity evidence for the short form.

Brief Reports

637 Revisiting the Paradox of Hope: The Role of Discrimination Among First-Year Black College Students
Ryon C. McDermott, April T. Berry, Nicholas C. Borgogna, Hsiu-Lan Cheng, Y. Joel Wong, Brandon Browning, and Nicole Carr
Academic retention is a critical concern for many colleges and universities and an issue that disproportionately impacts students of color. Black students are particularly likely to experience difficulties in college, partly due to experiences of discrimination. The present study found evidence that a core construct in positive psychology, hope, may not always protect Black students from experiencing the psychological sting of discrimination, but it was still beneficial to their academic well-being.

645 Why Does Acculturative Stress Elevate Depressive Symptoms? A Longitudinal Study With Emotion Regulation as a Mediator
Rebecca Y. M. Cheung, Miron Kumar Bhowmik, and Ming-Tak Hue
Our findings suggest that emotion regulation difficulties serve as a mechanism between acculturative stress and depressive symptoms in a sample of Mainland Chinese female university students. As such, addressing emotion regulation difficulties can alleviate the negative impact of acculturative stress on depressive symptoms.

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712 Risk for Psychotherapy Drop-Out in Survival Analysis: The Influence of General Change Mechanisms and Symptom Severity
Sebastian Gmeinwieser, Kai Sebastian Schneider, Maximilian Bardo, Timo Brockmeyer, and York Hagmayer
Realization of general change mechanisms and changes in symptom severity over the course of treatment were used to predict drop-out in a survival analysis. Interpersonal experiences showed a significant association with drop-out and it is therefore advisable to monitor interpersonal experiences on a regular basis.

723 Feedback-Informed Treatment: A Systematic Review and Meta-Analysis of the Partners for Change Outcome Management System
Jan Hyld Pejtersen, Bjørn Christian Arleth Viinholt, and Helle Hansen
The Partners for Change Outcome System (PCOMS) is a feedback system that has been developed to improve psychotherapeutic treatment. We evaluated the effect of the PCOMS in a systematic review including studies that used a randomized controlled trial design. We found no evidence that the PCOMS feedback system has an effect on the number of sessions attended by clients or that the PCOMS improves the well-being of clients.

736 Self-Critical Perfectionism and Lower Daily Perceived Control Predict Depressive and Anxious Symptoms Over Four Years
David M. Dunkley, Claire J. Starrs, Lucie Gouveia, and Molly Moroz
This study demonstrates that individuals with higher self-critical perfectionism are vulnerable to depressive and anxious symptoms over the longer-term when these individuals have lower perceived control over daily stressors. The findings highlight the importance of considering self-critical perfectionism and daily perceived control in the prevention and treatment of depression and anxiety.

Brief Report

747 The Roles of Time Discounting and Delay of Gratification in Career Outcomes
Hui Xu and Mengxi Yin
The present study supports a sequential dual mediator model in which time discounting is negatively predictive of career and life satisfaction through delay of gratification and career commitment. The study demonstrates the roles of two general intertemporal choice orientations (i.e., time discounting and delay of gratification) and one career-specific intertemporal choice orientation (i.e., career commitment) in career outcomes and, therefore, sheds light on the clinical importance of the intertemporal choice perspective.

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Articles

371 Mapping the Terrain of *Journal of Counseling Psychology*: A Citation Network Analysis
Mike C. Parent, Bonnie Moradi, Alexandra S. Weis, and Staci Ouch
This study reveals how authors have cited publications in *JCP* to generate and inform key domains of scholarship on counseling, work, and diversity. The findings also suggest areas that could be revisited and connected to generate new advances (e.g., anger and social justice activism, clinical judgment, and artificial intelligence).

390 *"We Are Our Own Community":* Immigrant Latinx Transgender People Community Experiences
Roberto L. Abreu, Kirsten A. Gonzalez, Cristalís Capielo Rosario, Gabriel M. Lockett, Louis Lindley, and Sharrah Lane
Little is known about how communities serve as a source of support and oppression to immigrant Latinx transgender people in the U.S. and in their countries of origin. The current study explorers the role that communities play in the well-being and oppression of immigrant Latinx transgender people.

404 The Development and Initial Validation of the White Fragility Scale
Kimberly J. Langrehr, Laurel B. Watson, Alexa Keramidas, and Sarah Middleton
This study provides evidence for the psychometric properties of the White Fragility Scale (WFS), a measure intended to assess expressions of White fragility when faced with or in anticipation of racial discomfort. Study results highlight how expressions of White fragility serve to protect White innocence while also reinforcing the normalization of Whiteness.

418 Psychotherapy Racial/Ethnic Disparities in Treatment Outcomes: The Role of University Racial/Ethnic Composition
Jesse Owen, Jeremy Coleman, Joanna M. Drinane, Karen Tao, Zac Imel, Bruce Wampold, and Mark Kopta
The demographic composition of universities and colleges contributes to racial/ethnic disparities in psychotherapy outcomes. Providers and administrators should not only examine contextual factors on campuses, but also consider how to better support the students who comprise their unique campus communities.

425 Are Work Well-Being Variables Distinct? A Bifactor Model of Fulfilling Work
Blake A. Allan, Taewon Kim, Tracie Y. Liu, and Rhea L. Owens
This study found that different aspects of well-being at work, such as meaningfulness and job satisfaction, reflect the same underlying experience. This finding has implications for future research and interventions focused on improving people's well-being at work.

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435 Insight as a Mechanism of Change in Dynamic Therapy for Major Depressive Disorder
Simone Jennissen, Mary Beth Connolly Gibbons, Paul Crits-Christoph, Henning Schauenburg, and Ulrike Dinger
This study suggests that insight is a potential change factor in dynamic psychotherapy for depression. Understanding problematic relationship patterns may lead to better symptom improvement for patients.

446 Intraindividual Dynamics Between Alliance and Symptom Severity in Long-Term Psychotherapy: Why Time Matters
Matthias Volz, Simone Jennissen, Henning Schauenburg, Christoph Nikendei, Johannes C. Ehrenthal, and Ulrike Dinger
This study shows that alliance predicts subsequent therapy success and vice versa in patients with long-term therapy. Moreover, our study suggests that these associations become stronger over the course of about 40 weekly sessions in patients with long-term treatment.

457 Does Peer Relationship Matter? A Multilevel Investigation of the Effects of Peer and Supervisory Relationships on Group Supervision Outcomes
Harold Chui, Xu Li, and Sarah Luk
Clinical training often takes place in groups. This study provides evidence that supervisors and peers have unique contributions to training outcomes in group supervision. This study lends support to the recommendation that when designing training programs, attention should be paid to the quality of peer relationships in addition to supervisory relationships.

467 Latent Profile Analysis of Interpersonal Problems: Attachment, Basic Psychological Need Frustration, and Psychological Outcomes
Meifen Wei, Brent Mallinckrodt, Brooke J. Arterberry, Shuyi Liu, and Kenneth T. Wang
In two studies, we used interpersonal problems to identify and confirm three profiles of interpersonal problems described as Flexible-Adaptive, Exploitable-Subservient, and Hostile-Avoidant. We found that adult attachment and frustration of specific psychological needs were associated with these three interpersonal problem profiles. Finally, our results indicated that those with the Hostile-Avoidant profile reported the worst psychological outcomes, followed by those with the Exploitable-Subservient profile, and those with the Flexible-Adaptive profile reported the best psychological outcomes.

489 Relations Among Daily Stressors, Childhood Maltreatment, and Sleep in College Students
McKenzie Kaubrys, Majel R. Baker, Patricia A. Frazier, and Viann N. Nguyen-Feng
College students' daily sleep is related both to the number of daily stressors they experienced and the amount of maltreatment they experienced as children. Stress management interventions might improve sleep, and greater attention needs to be paid to the prevalence of maltreatment among college students and how it may relate to student health.

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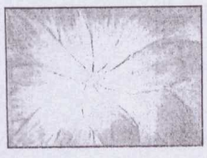

About the Artist: Ally Iredale, a sixth-grade student at Springer School & Center, created an oil pastel piece of a flower. After studying the artist Georgia O'Keeffe and her artwork, students imitated her "up close and personal" style to create an oil pastel piece with elements of realism and abstraction. Ally described how she created her flower by first looking at examples in class, sketching her idea, outlining her drawing, and then adding color. Ally started the shading process by first using a white oil pastel and then gradually increasing the darkness of the coloring as she moved to the outside of the flower petals, blending with her fingers as she worked. When asked about her interest in art, Ally stated she enjoys the creativity and playing with different colors and materials to make her pieces. In her free time, she draws inspiration from nature, particularly birds, which she will sketch or paint at her house. Outside of school, Ally enjoys gymnastics, playing soccer, reading, and doing yoga. Ally attends Springer School and Center in Cincinnati, Ohio. Through its day school and outreach programs, Springer empowers students with learning disabilities to lead successful lives.

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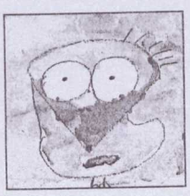

About the Artist: Brooklyn Hambleton's inspiration for her artwork came from American pop artist James Rizzi. In art class, Brooklyn learned how James Rizzi used youthful graphics and vibrant colors to produce three-dimensional pieces. When Brooklyn was choosing a subject matter for her painting, she reported that "I looked at everybody else's painting. And I thought, 'I don't want to make it just like theirs. I can make whatever I want.' " And so, Brooklyn chose to paint a bird. Brooklyn first outlined her bird using oil pastels, then added paint, and then waited "a LONG time for it to dry." Brooklyn is a 7- year-old who attends Springer School and Center in Cincinnati, Ohio. Through its day school and outreach programs, Springer empowers students with learning disabilities to lead successful lives. Outside of school Brooklyn enjoys coloring, painting, and playing on her playset.

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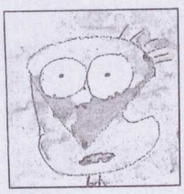

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About the Artist: Garth Kelsey lives in Annapolis, Maryland, and is a junior at the Harbour School. He has a red belt in Tae Kwon Do. Garth's self-portrait is a cyanotype, which was created from a black-and-white selfie and to which the tones were inverted. This negative was then printed onto a transparency, placed over a primed cyanotype sheet and developed in sunlight.

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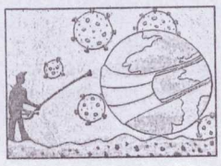

About the Artist: Hemanth Mishra, a young and dynamic artist, always has the passion and purpose to learn something new all the time. At the age of 10, he was diagnosed with learning disabilities, yet as parents, we always believe that he's a child prodigy. Early in his life, we found his interest in arts and his excitement to explore the world of painting. He didn't define himself as an artist but rather as a person interested only in expressing basic human emotions such as nature lover, cartoon admirer, ecstasy, and so on. The teachers of Sankalp The Open School have always encouraged him to learn and gave opportunities to polish his skill sets. Sankalp is a school in Chennai, India, that provides a "differentiated learning environment to children with learning challenges and cognitive difficulties."

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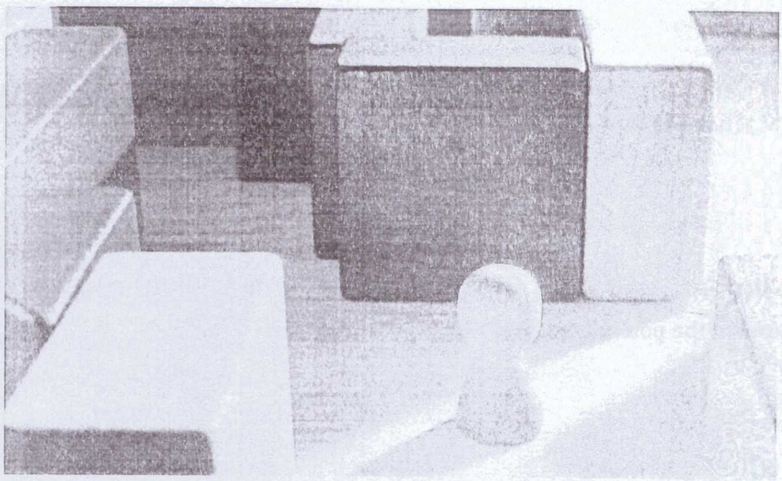

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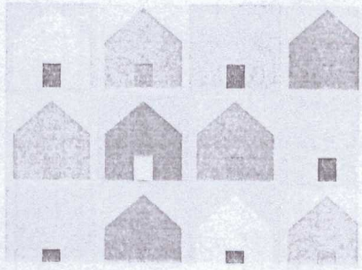

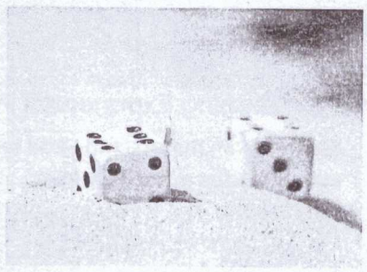

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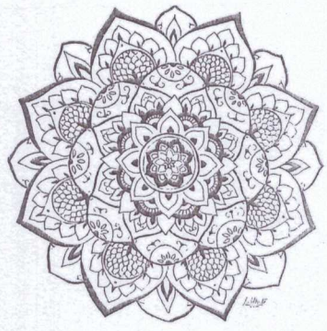

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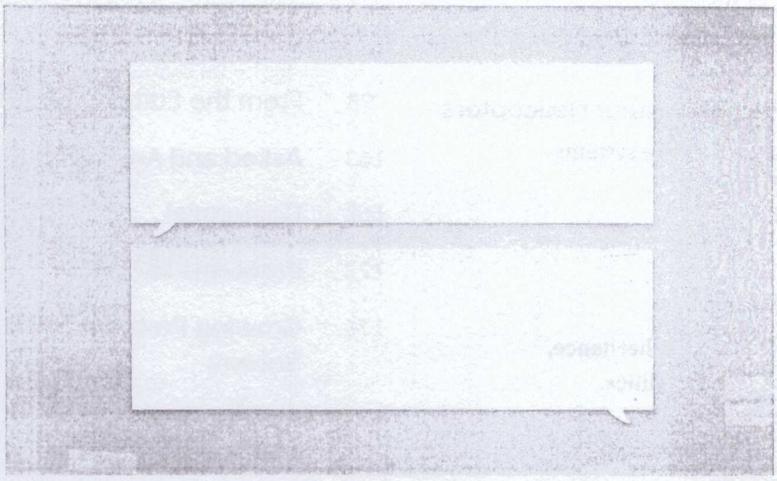

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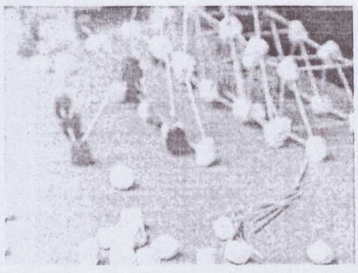

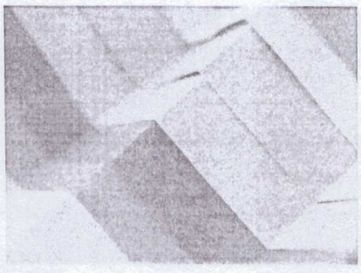

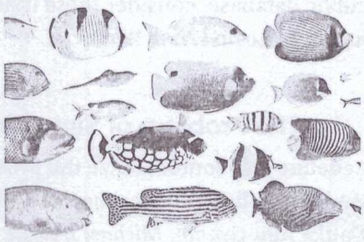

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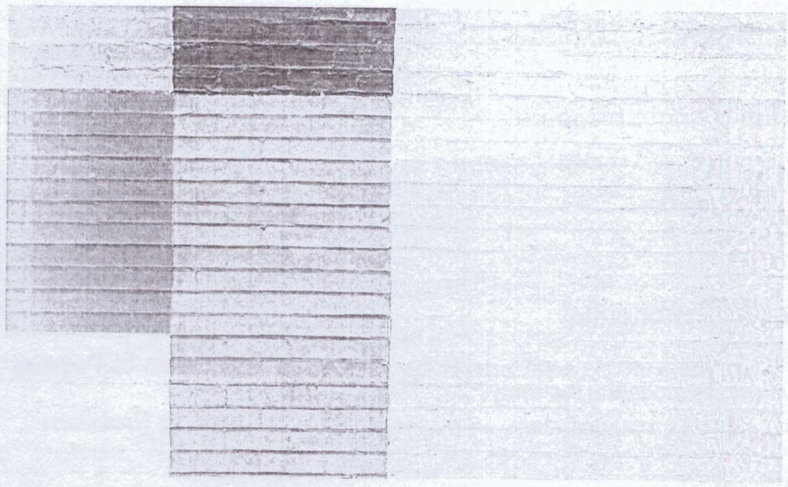

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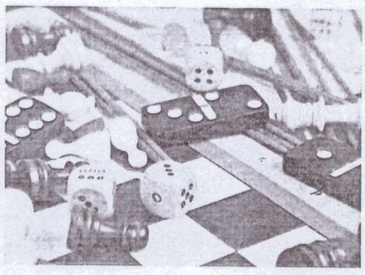

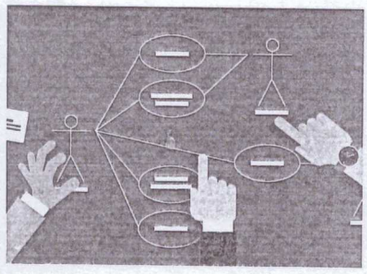

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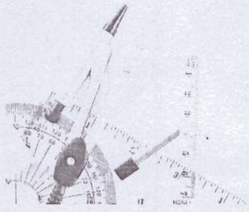

Using the space of two dimensions to exhibit pi

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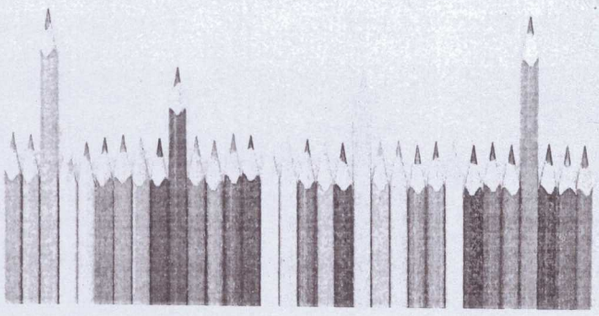

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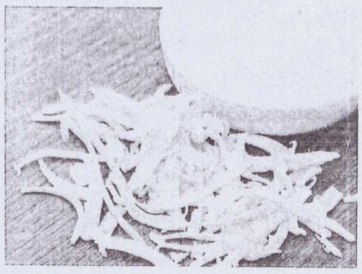

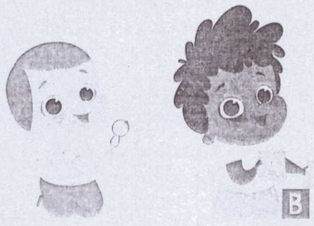

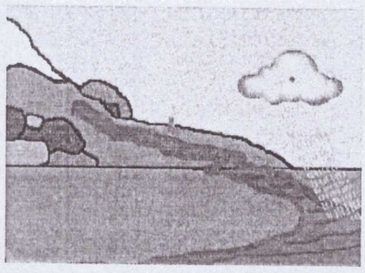

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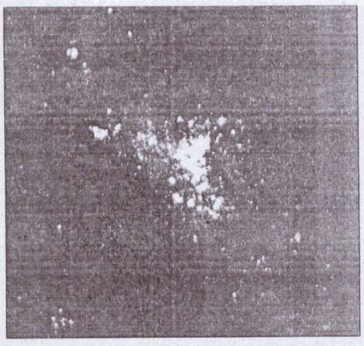

With Reason: A Portrait of Sophia Kovalevsky (1850–1891)

CORRECTIONS

The Problems to Ponder article in the January 2020 issue contained an error. In the first graphic of problem 14, the inner number of the third triangle should be 0.65.

The Problems to Ponder article in the February 2020 issue also contained an error. Problem 28 should read: For which values of x and y is $\ln(xy) = \ln(x/y)$?

In the February 2020 issue, there was an error in figure 3 in the "Probabilities of Sickle Cell Disease" article. The correct version of figure 3 can be seen here.

Fig. 3

Mother Father



Paper bags were used to conduct the trials for Jaelon's parents.

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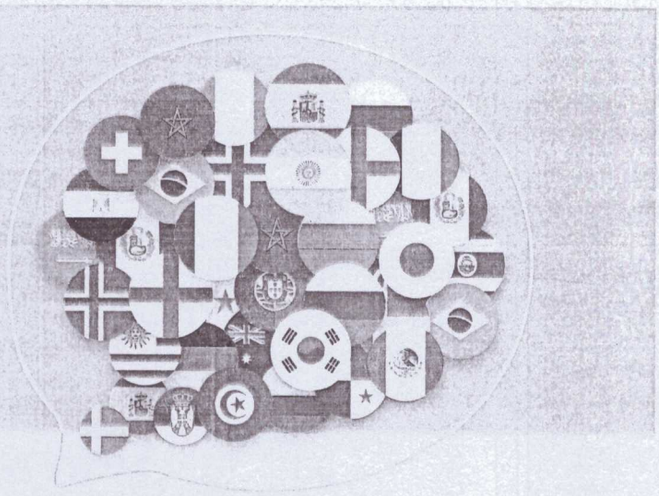

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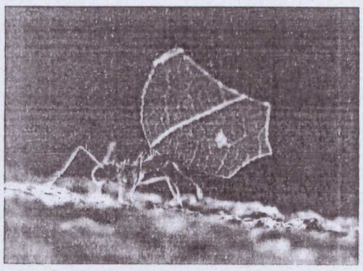

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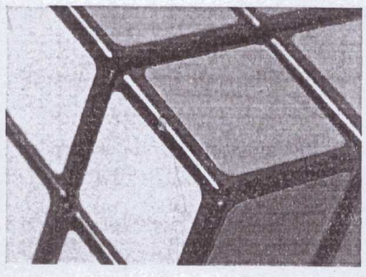

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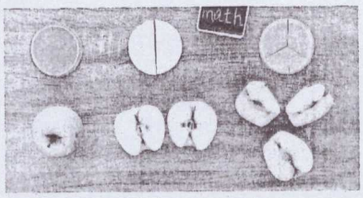
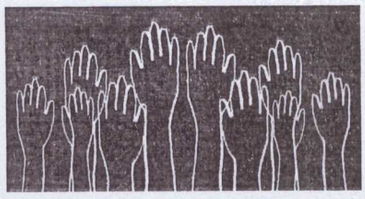


Opportunities for Redefining Unconventional Units

Reimagining units in alternative ways allows students to build a conceptual understanding of fractions.

Nicole M. Wessman-Enzinger and Kristina M. Hofer



468 **Classroom Rules Reimagined as the Rights of the Learner**

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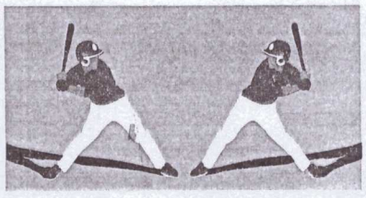

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Samuel Otten, Wenmin Zhao, Zandra de Araujo, and Milan Sherman

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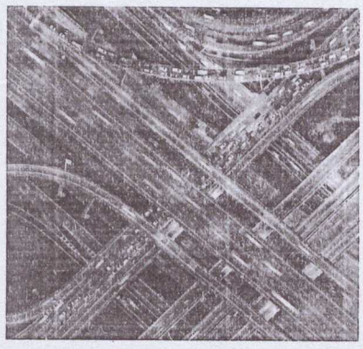

Pythagoras's Quilt

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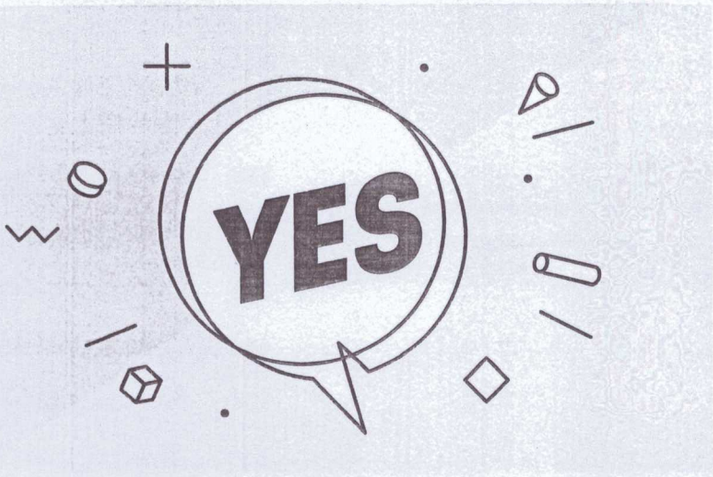

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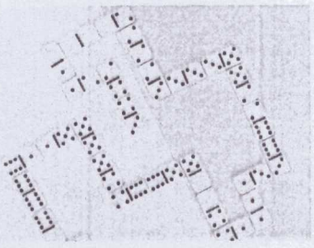

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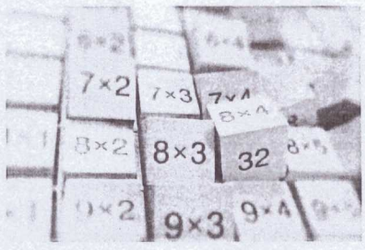

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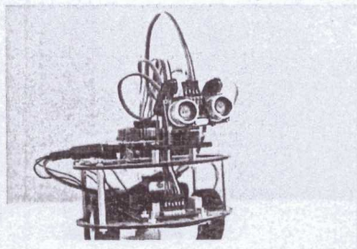

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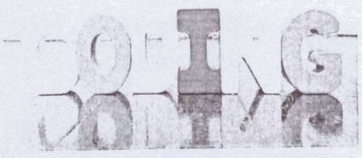





K–2

The Nuts and Bots of Math and Coding in the Lower Grades

The authors highlight their experiences in using robots and coding to engage K–2 students with specific mathematics standards.
J. Jeremy Winters, Kristin E. Winters, and Dovie L. Kimmins

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Gladys's Lesson Plan: A Culturally Relevant Exemplar

One prerequisite to implementing a holistic form of culturally relevant pedagogy is to plan spaces, opportunities, and lessons for making connections.
Nickolaus A. Ortiz and Trina J. Davis

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All the Way Around a Circle: An Angle Lesson

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Exploring Relationships between 0.999 . . . and 1

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Geometric Modeling: Determining the Largest Lake

During a middle school task, students compare the sizes of Lake Tahoe and Flathead Lake.
Megan H. Wickstrom and Matt B. Roscoe

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The First Days of Geometry

Students use movement and tracing paper to determine sets of points that are equidistant from two points, from two intersecting lines, and from a line and a point not on the line.
Wayne Nirode

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Correction

In the May 2020 issue, the article "Investigating Using Lesson Study" had an error in figure 3. The solution for (d) should be 6/7 inches.

Calling All Authors:

You Have a Story to Tell!

Contribute to *MTLT* between July 1, 2020, and August 31, 2020, to be entered in a contest for a $50 Amazon gift card*

Consider sharing your experience as a mathematics teacher with a larger audience by submitting an article to ***Mathematics Teacher: Learning and Teaching PK–12***. We welcome new authors!

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*Winner will be notified by email no later than September 15, 2020.

Your submission will be one of three article types: **Front & Center, Feature, or Focus.** Details on article types can be found in the **Submission Guidelines** on the *MTLT* site (https://pubs.nctm.org/view/journals/mtlt/mtlt_overview.xml).

To help you get started, watch **You've Got Stories: Now It's Time to Write!**, a webinar by *MTLT* Editor-in-Chief Angela Barlow and members of the Editorial Board, geared to first-time writers. Access it at www.nctm.org under Conferences & Professional Development's **"100 Days of Professional Learning"** section (June webinar series).

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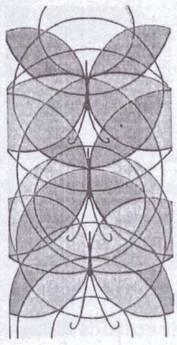

The Beauty of Mathematics and Art

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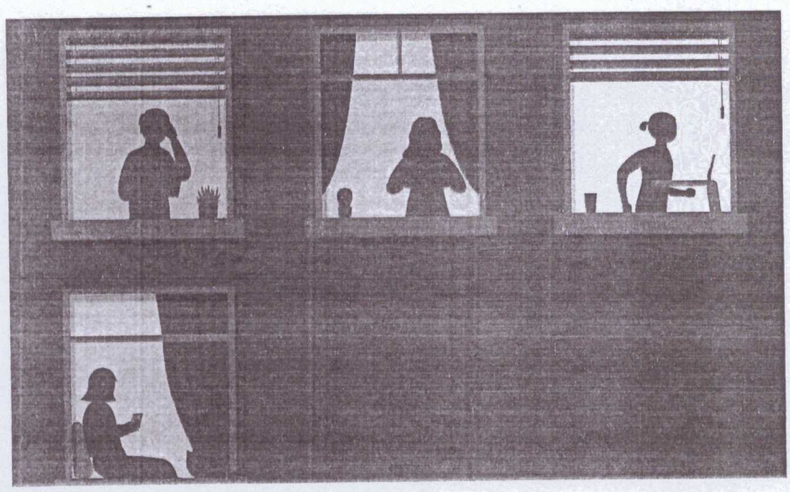

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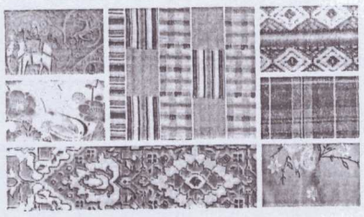

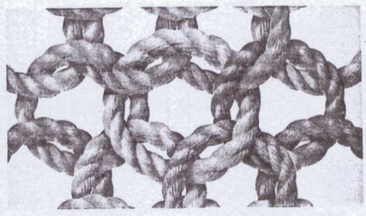



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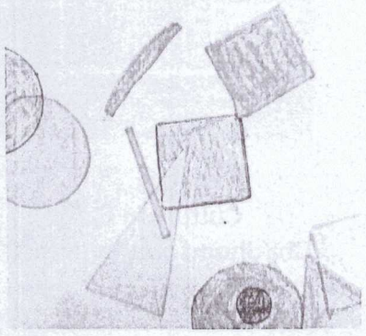

A "Composition" of Color and Mathematical Content

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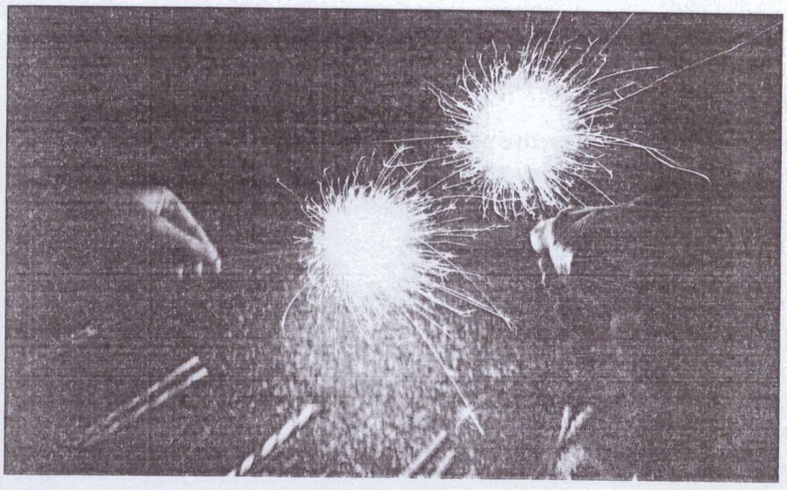

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DeAnn Huinker, Sarah B. Bush, and Karen J. Graham

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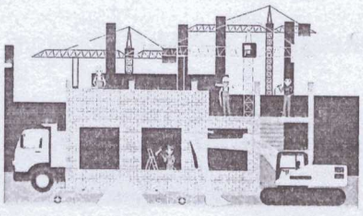

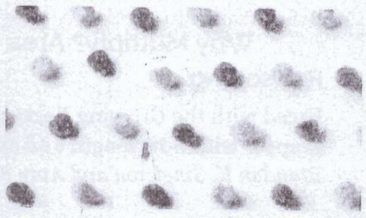

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Fostering Parent–Child Math Talk with the 4Cs

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Anastasia L. Betts and Ji-Won Son

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Beyond Hooks: Real-World Contexts as Anchors for Instruction

Teachers offer students the chance to learn new mathematics by solving contextual problems that ground reasoning and support transitioning to abstract thinking.

Michelle L. Stephan, Luke T. Reinke, and Julie K. Cline

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Developing and Writing Language Objectives

A process of analyzing student work to identify language-related areas of strength and growth is used to articulate language goals that complement content goals.

Megan Staples, Mary P. Truxaw, and Vanessa Cruz

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Addie Armstrong and Dan McQuillan

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The insights gained through Chalk Talk, a nonverbal, interactive procedure that can be used to develop cocreated norms, shaped the support provided by both the teacher and students throughout the year.
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Brandon K. Singleton and Amy B. Ellis

e43 **Revising Tasks to Be Culturally Relevant**
Mathematics teachers must learn about and develop strategies to effectively teach students who have cultural backgrounds and experiences different from their own.
Heather R. Gallivan

e51 **The Status Quo Is Unacceptable**
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Patterns in Poetry

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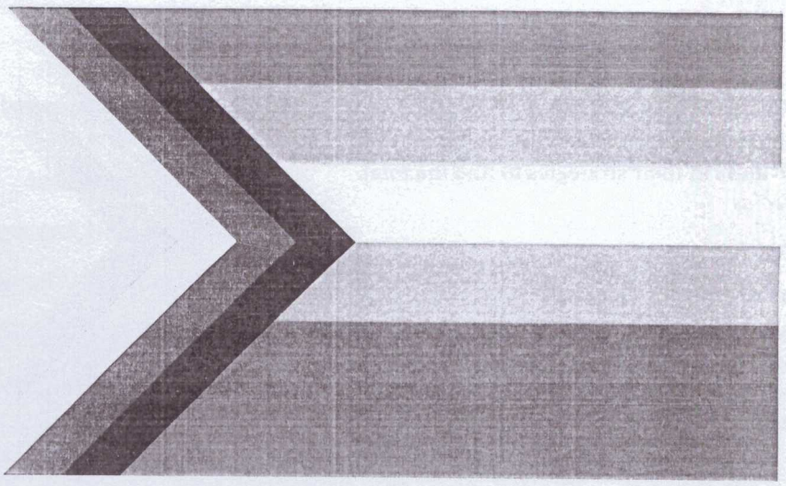

874 Supporting LGBTQ+ Students in K–12 Mathematics

Strategies for creating a more equitable learning experience range from engaging in self-education to creating inclusive classroom spaces and adopting inclusive curriculum and pedagogy.
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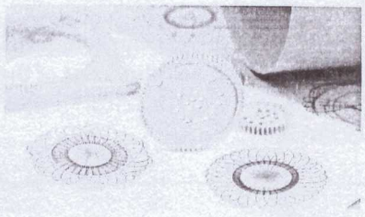

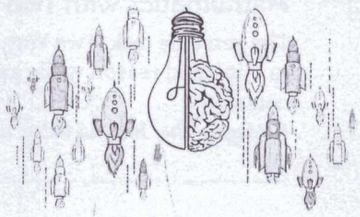

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Exploring Playground Access with Mathematics

Four-year-old children draw on their mathematical and community knowledge to begin to explore the lack of public playgrounds in their local community.
Jennifer Ward

Doing Mathematics with Spirograph

Inspired by earlier articles on the classic drawing toy that targeted higher grade levels, the authors adopt and create activities that make Spirograph mathematics accessible to middle-grades learners.
Rui Kang, Sheri Johnson, Emily Lambert, and Candi Davidson

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904 Constructing Goals for Student Learning through Conversation

The authors define learning goals, differentiate them from performance goals, and elaborate on their function and importance as the guiding force behind maintaining cognitive rigor during mathematics learning.
Jessica Hunt and Mary Kay Stein

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Improving Written Mathematical Arguments

Two teachers look to empower their students to translate their mathematical talk into writing.
Jennifer L. Pallanck, Gabriel O. Castro, Madelyn W. Colonnese, and Tutita M. Casa

Not Just Number: Representation Talks

This routine benefits teachers and students while supporting students' reasoning across mathematical domains.
Matthew P. Campbell

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925 Productive Technology Use in Mathematics Explorations

This article investigates different ways that online, interactive diagrams can be used in secondary mathematics classrooms.
Thomas D. Coleman and Janet D. K. Walkoe

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Math Medley

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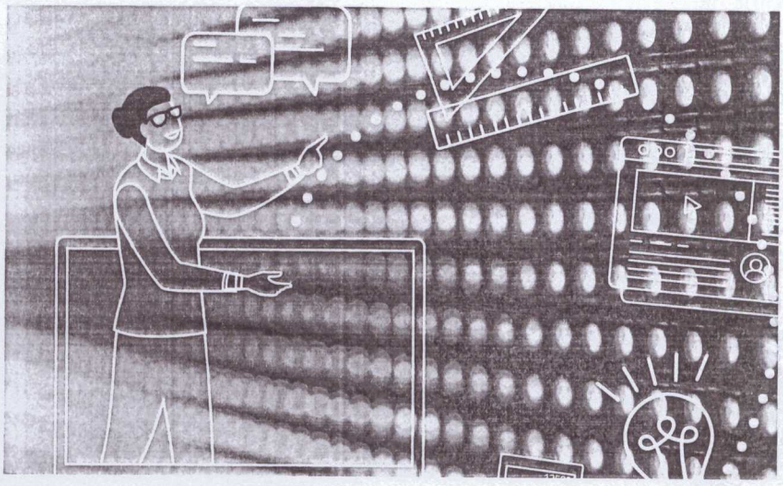

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Angela T. Barlow, Clayton Morgan Edwards, Rebecca Robichaux-Davis, and Ruthmae Sears

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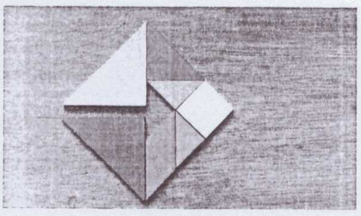

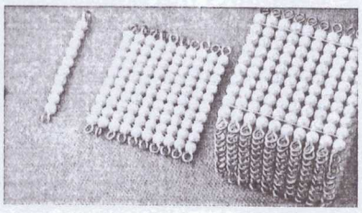

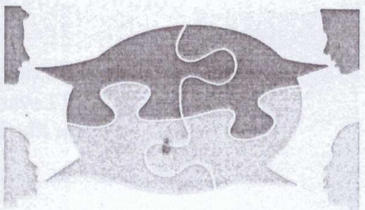

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Children's Games and Games for Children

Social games like tag and duck-duck-goose and organized sports are not only a familiar part of growing up but also can extend into a child's classroom, where games are a popular tool to engage early learners in mathematical activity.
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Claim-Rule-Connection: A Strategy for Justifying Reasoning

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Melissa D. Gunter and Kate M. Raymond

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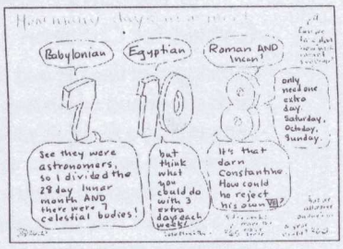

Talking Numbers

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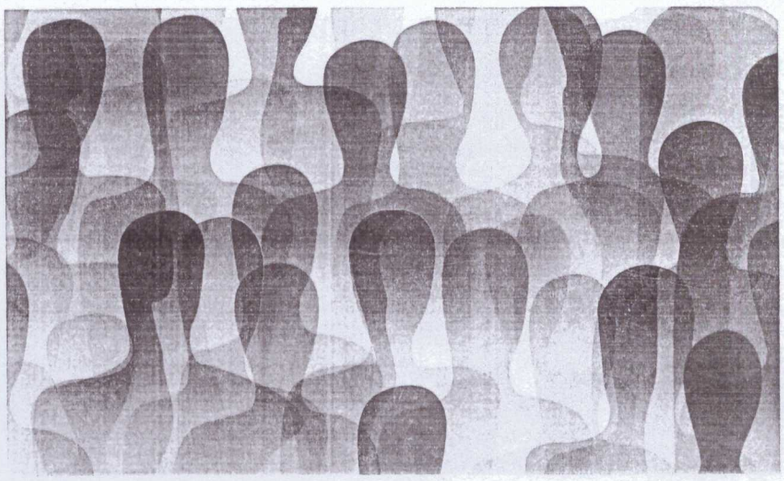

6 Practicing Culturally Responsive Mathematics Teaching

This article aims to bridge the gap between the theory and practice of CRT, giving teachers ideas of how to increase the mathematics achievements of students from diverse backgrounds.
By Emily P. Bonner

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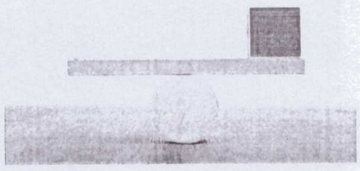

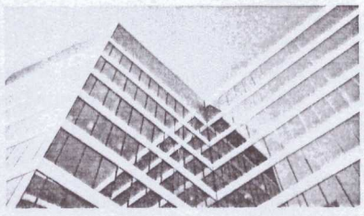

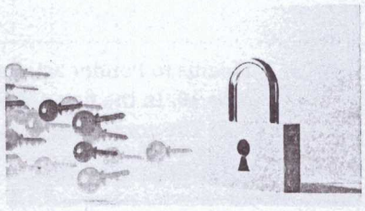

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27 Geometric Reflections: Why Should They Not Be Just a Flip?

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55 Discourse Can Create a Learning Culture

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By Kelly Curtis, Katrina Lindo, and Amanda Jansen

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63 Guiding Questions for Selecting Mathematical Examples

The author demonstrates ways that examples can matter in mathematics teaching and gives some ideas to think about with respect to selecting them.
By Rachel B. Snider

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70 Infusing the Day with Mathematical Moments

Instructors can move beyond teachable moments and begin planning ways to make mathematics a part of all aspects of the school day.
By Elizabeth P. Cunningham

COMMENTARY

The Problems to Ponder article in the March 2020 issue contained an error in problem 10. In the first section of the problem, the last line should read $1 > 10 = 12$. The correct version of the problem can be seen here:

10 Imagine there is a new operation >

$$5 > 6 = 16$$
$$6 > 4 = 16$$
$$10 > 1 = 21$$
$$1 > 10 = 12$$

Find the value of each question mark:

(a) $6 > 10 = ?$
(b) $7 > ? = 14$
(b) $? > 3 = 23$

For Futher thought: What could be the values of g and m?

$$g > m = 35$$

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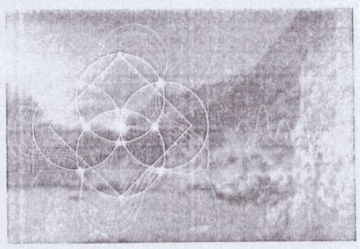

The Shape of Art: Mathematics Connections

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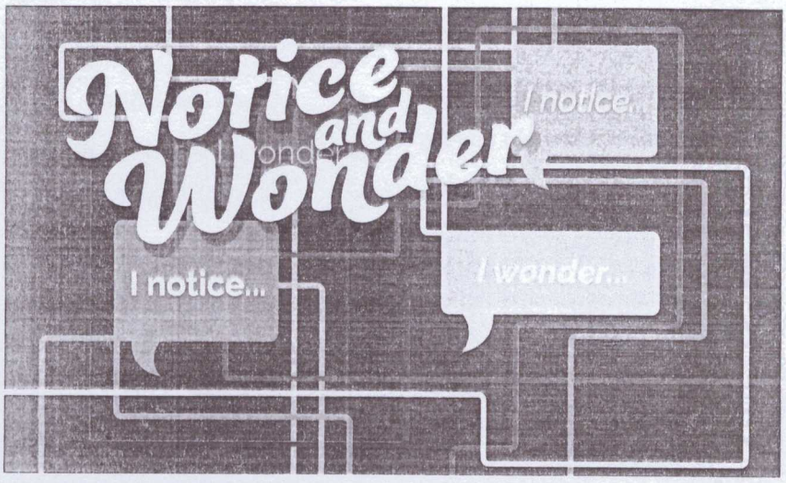

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By Tracy E. Dobie and Eleanor R. Anderson

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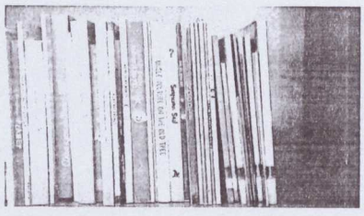

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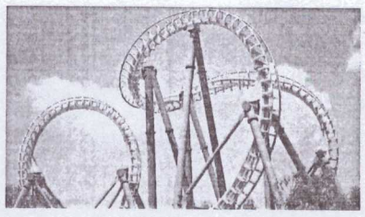
Bringing Mathematical Life to Favorite Books

The authors share five strategies for using a picture book library to create engaging and standard-supporting lessons in mathematics.
By Kimberly Morrow-Leong, Sara Delano Moore, and Linda M. Gojak



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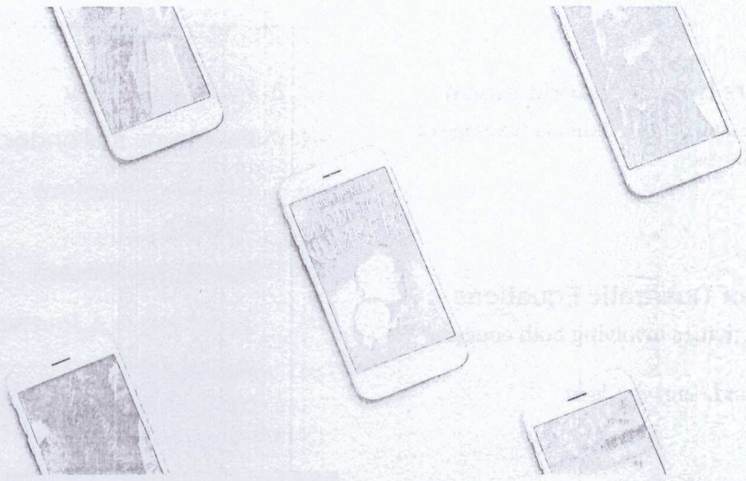

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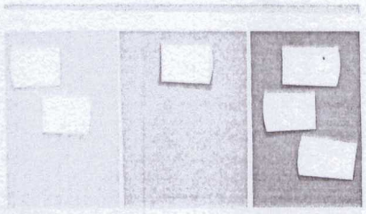

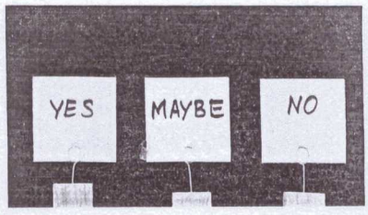

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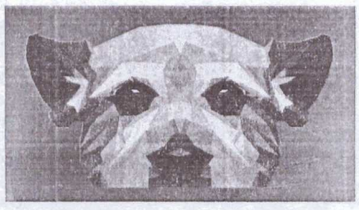

Euclid's Best Friends

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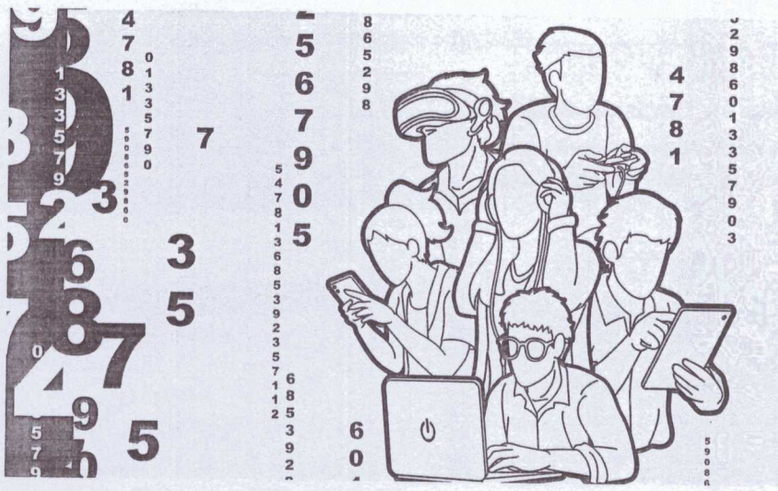

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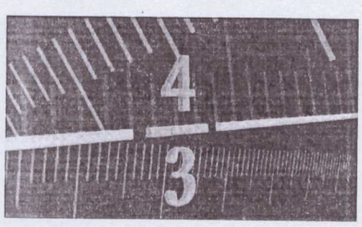

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Use student thinking to orchestrate classroom discussions about fractions.
By Susan Ahrendt, Debra Monson, and Kathleen Cramer



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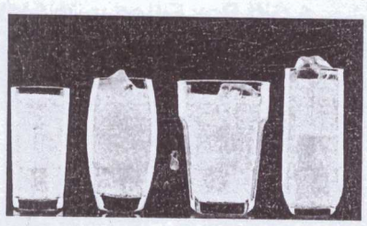
Design principles are used to construct and refine a lesson involving a graphing calculator.
By Jon D. Davis



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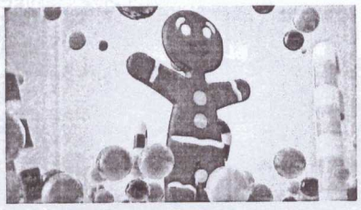

Cakes, Cookies, and Gumballs, Oh My!

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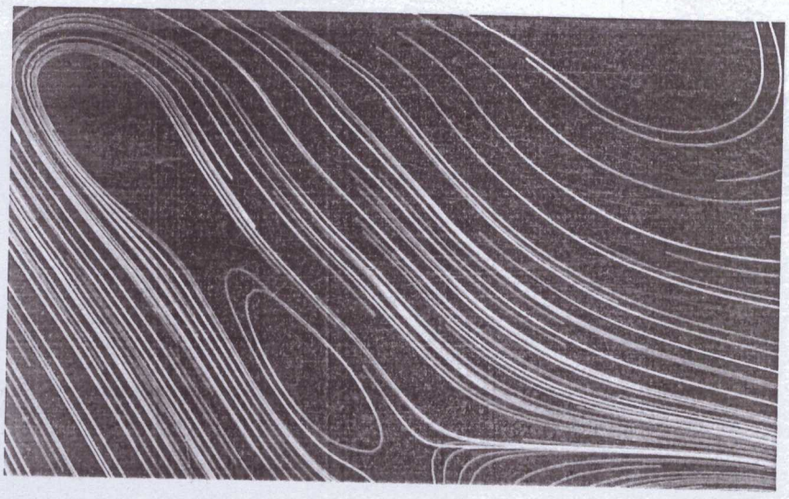

352 **The Nature of Mathematics: Let's Talk about It**

Teachers in the K–12 classroom can offer opportunities for their students to reflect on the nature of mathematics (NOM) as they learn.
By Lucy A. Watson, Christopher T. Bonnesen, and Jeremy F. Strayer

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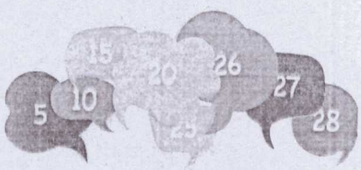

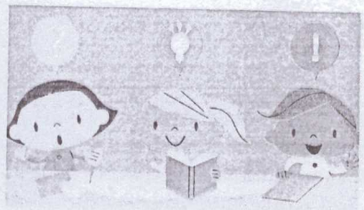

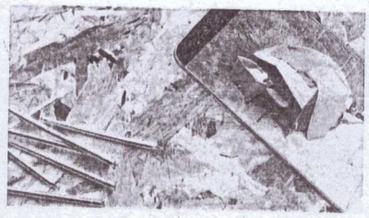

PK–2

Supporting Mathematics Talk in Kindergarten

Use these three practices that can bolster the efforts of young learners to communicate about mathematical ideas in powerful ways.
By Hala Ghousseini, Sarah Lord, and Aimee Cardon

Promoting Inquisitiveness

Curious young minds can guide discovery and make traditional mathematics concepts lively and exciting.
By Tracy Manousaridis

6–8

Student Actions for Social Justice-Oriented Mathematical Tasks

A project aimed at engaging middle school students with real-life problem solving helped them view mathematics as a tool for understanding social justice issues.
By Hyunyi Jung and Sarah Brand

9–12

Parameters, Sliders, Marble Slides, Oh My!

Three technological activities to explore parameters of quadratic functions each have their own affordances and constraints.
By Nina G. Bailey, Demet Yalman Ozen, Jennifer N. Lovett, Allison W. McCulloch, and Charity Cayton

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395 The Structure of the Quadratic Formula
Explorations into this concept can offer students opportunities to learn about the formation of algebraic expressions.
By Kristin Frank

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By Jaclyn Murawska

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In the February 2021 article, "Engaging Students through Modeling," by Rocco Magaletto, the following reference has been updated to include the relevant book chapters: Gould, Heather, Diane R. Murray, and Andrew Sanfratello, eds. 2011. "Chapter 12: Estimating Temperatures" and "Chapter 19: Viral Marketing." In *The Teachers College Columbia University Mathematical Modeling Handbook*, pp. 109–16 and 169–76. New York: Consortium for Mathematics and Its Applications. https://www.comap.com/modelingHB/

An Introduction to REALM

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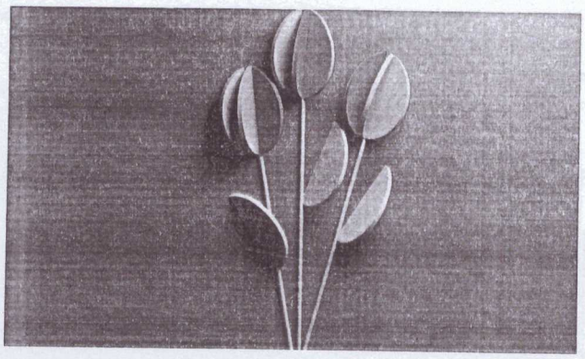

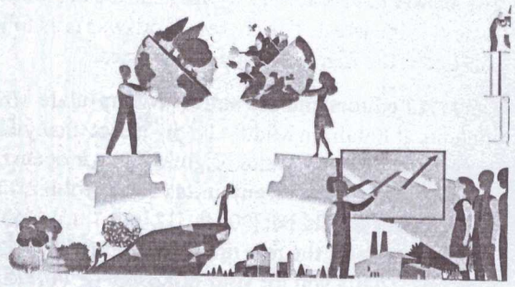

Growing TTULPs through Your Lessons

The authors set out to revise the Thinking Through a Lesson Protocol (TTLP) by incorporating UDL to encourage lessons that foster greater access for all students, drawing on their strengths and learning differences.

By Jonathan D. Bostic, Brooks Vostal, and Timothy Folger

508 **Making Sense of a Data-Filled World**

A new data science PK–12 initiative is designed to offer resources for teachers that they can use to excite and educate their students.

By Jo Boaler, Tanya LaMar, and Cathy Williams

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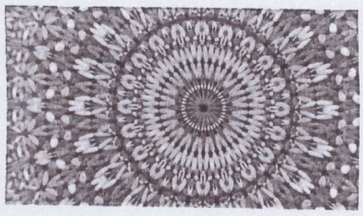

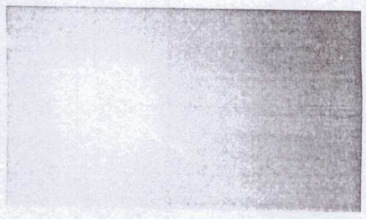

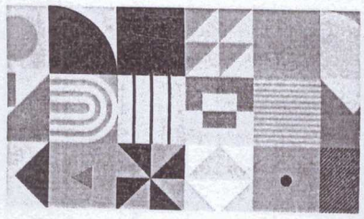

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Using TileFarm to Support Emerging Multiplication

Students' conceptual understanding of addition and multiplication can be strengthened using symmetric dot patterns created with software that bridges mathematics and art.

By Matt B. Roscoe

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528 **Understanding the Real World: Sweaty Jo**

An activity introduces middle school students to the mathematical ideas behind the danger of leaving small children in hot cars.

By Jill P. Brown

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536 **Developing Spatial Skills through Mental Rotation Activities**

Because success in STEM fields largely results from robust spatial skills, learners in grades 6–8 undertake various activities to help bolster their ability to perform mental rotations.

By Atara Shriki and Dorit Patkin

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CORRECTION

The answer to **Problem 17 in April 2021's Problems to Ponder** (Volume 114 Issue 4) is incorrect. The corrected answer is as follows: The front tires rotate 85.9 times, the rear tires rotate 57.3 times.

The *MTLT* editors and the author congratulate Mr. Chris Bridgham and his students at Katahdin Middle High School (Stacyville, Maine) on discovering this error. The error in the original answer occurred because we neglected to account for the different units in the problem. The correct answer for the front tire should be: [900 ft. (12 in. / 1 ft.)] / (40π in.) ≈ 85.9 rotations. The correct answer for the rear tire should be: [900 ft. (12 in. / 1 ft.)] / (60π in.) ≈ 57.3 rotations. Thank you for your diligence in working through Problems to Ponder and best wishes on your future mathematical journeys.

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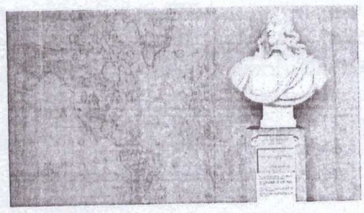

The Power of Sharing the History of Mathematics

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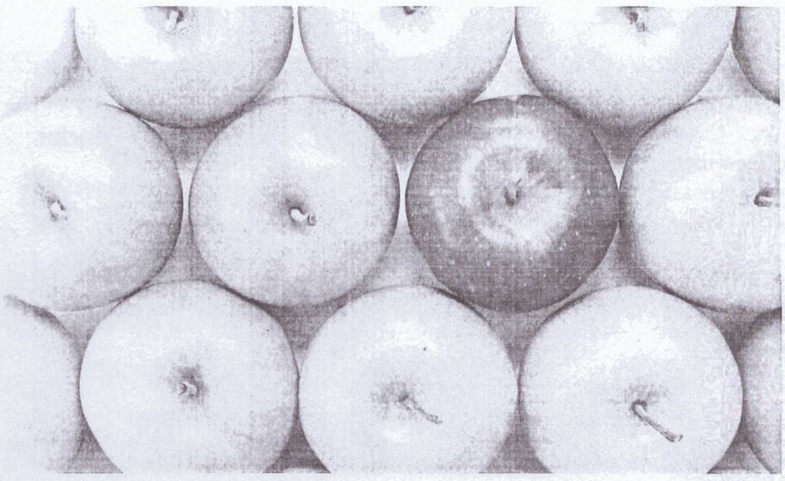

580 **MAKING WORD PROBLEMS MEANINGFUL**

Teachers can employ four strategies to help students recognize how relationships in the real world are represented in mathematics and to help them apply skills already familiar from reading.

By Melissa A. Gallagher, Laura Ellis, and Travis Weiland

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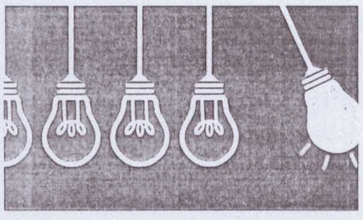



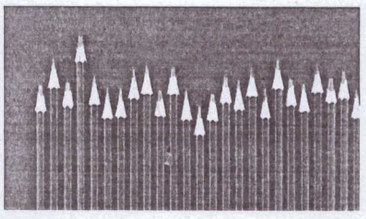

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Keep Calm and Press for Reasoning

Three routines can help teachers ask questions that elicit mathematical reasoning to foster student learning.

By Nancy Anderson

598 **Formative Assessment through Think Alouds**

The authors share an approach called whole-class think alouds, which allow students to collaborate and communicate their problem solving.

By Tiara Hicks and Jonathan D. Bostic

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607 **Visualizing the Arithmetic Mean**

Middle school students can improve their statistical literacy through two activities that engage them in analyzing measures of center and using transnumerative thinking.

By Michael Daiga and Shannon Driskell

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616 **Examining Errors and Framing Feedback**

A classroom research experiment encouraged students to analyze one another's work and engage in reflection as they explored misconceptions that arose in the mathematical process.

By Lindsay Vanoli and Jennifer Luebeck

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An activity helped students get a glimpse of how mathematics could be directly connected to an action they see every day—text messaging and the use of predict-text algorithms.
By Joshua Jones

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Code of the Rings

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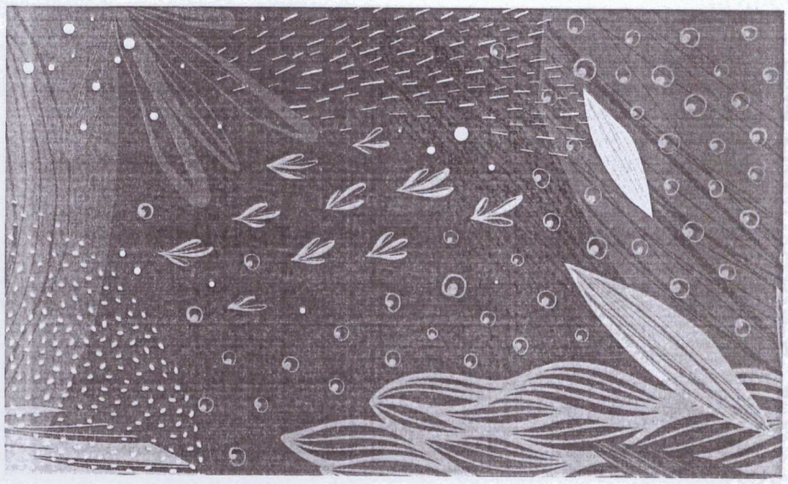

660 **The Magic Is in the Margins: UDL Math**

To give students with disabilities equal access to mathematical thinking and learning, the UDL Math framework encourages educators to create classrooms that start from inclusivity rather than a generic "average" student.

By Rachel Lambert

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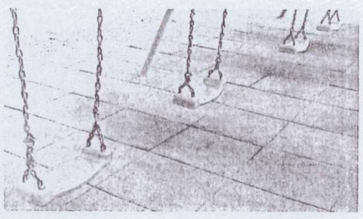



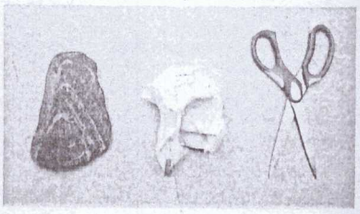

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Facilitating Student-Created Math Walks

Math walks allow students to be the center of their own learning experiences and help them connect mathematical concepts to their surroundings.

By Min Wang, Candace Walkington, and Koshi Dhingra

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672 **Student Engagement with the "Into Math Graph" Tool**

This tool can assist teachers in learning about their students' mathematics-related experiences by inviting them to define and document their engagement over time.

By Amanda K. Riske, Catherine E. Cullicott, Amanda Mohammad Mirzaei, Amanda Jansen, and James Middleton

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685 **Comparing Probabilities: Rock, Paper, Scissors, and Coin Toss**

An activity provides a way for students to explore theoretical and empirical probability in a hands-on approach that is grounded in games of chance.

By Elana Reiser

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691 Walking Away from a Mathematics Problem Is OK

A teacher affords his students the authority to express their frustration when the work is too much, allowing them to take a break and tackle the work the next day.
By Zachary Champagne

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696 Promoting Precision in a Virtual Environment

Applying exact terminology allows students to not only form and support conjectures but also to virtually engage in mathematical discourse.
By Kathryn Lavin Brave, Mary McMullen, and Cecile Martin

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Puddle Play!

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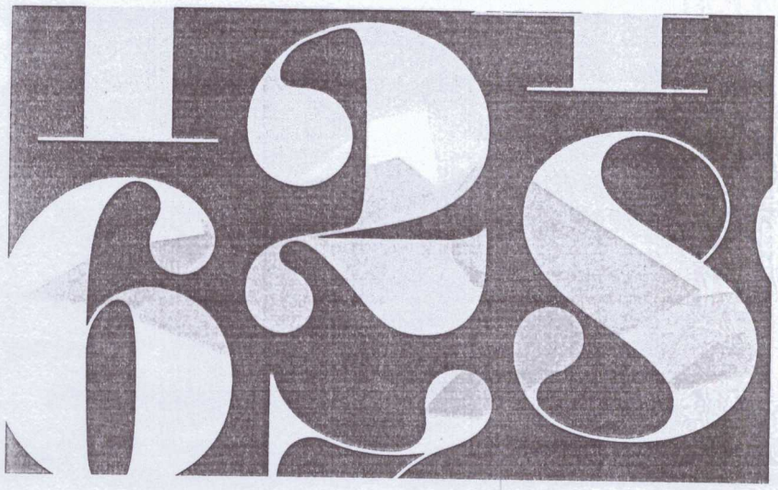

738 **Positioning Students to Explore Math with Technology**

Digital tools can provide effective ways for students to enter a mathematical problem, mediate discussions, and build personal and powerful ways of mathematical thinking.

By Allison W. McCulloch, Jennifer N. Lovett, Lara K. Dick, and Charity Cayton

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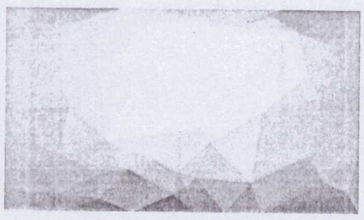
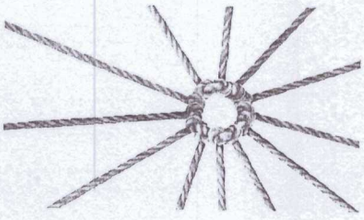


Building Powerful Mathematical Thinkers with dINBs

The TRU framework fosters online collaborative problem solving with digital interactive notebooks that position all students as doers of mathematics.

By Courtney K. Baker, Terrie M. Galanti, Kimberly Morrow-Leong, and Tammy Kraft



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759 **Everybody Still Plays: Virtual Engagement without Webcams On**

The author shares strategies that allow online classes to participate as a whole while honoring students' needs to keep their webcams off.

By Xi Yu



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768 **Graphing Technology Helps Narrow the Digital Divide**

By encouraging students to make the most of technology, teachers help them build the confidence needed to engage in higher-order thinking processes even if their skills in performing calculations are limited.

By Maria de Hoyos

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776 **Empowering Latinx Families to Help Children with Mathematics**

An innovative approach to support and empower Spanish-speaking families uses smartphones to share videos modeling conversations about mathematical concepts.

By Sabrina De Los Santos Rodríguez, Audrey Martínez-Gudapakkam, and Judy Storeygard

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781 **Exploring Matrices with Spreadsheets**

Students' procedural knowledge and conceptual understanding of matrix applications can improve when they use technology, particularly spreadsheets, as a tool.

By Marina Goodman

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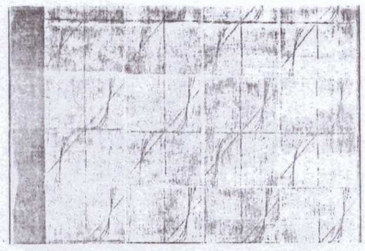

Weaving the Rainbow (Odd I)

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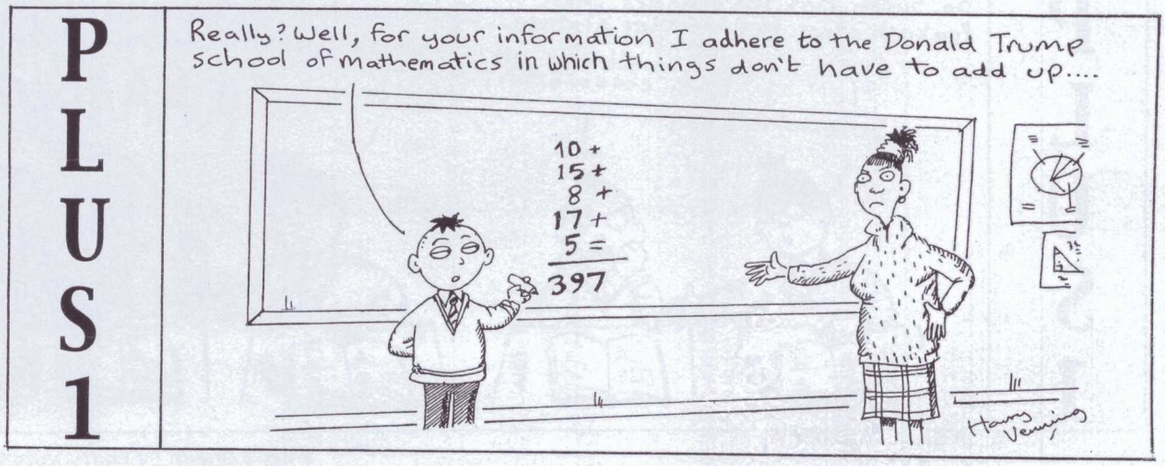

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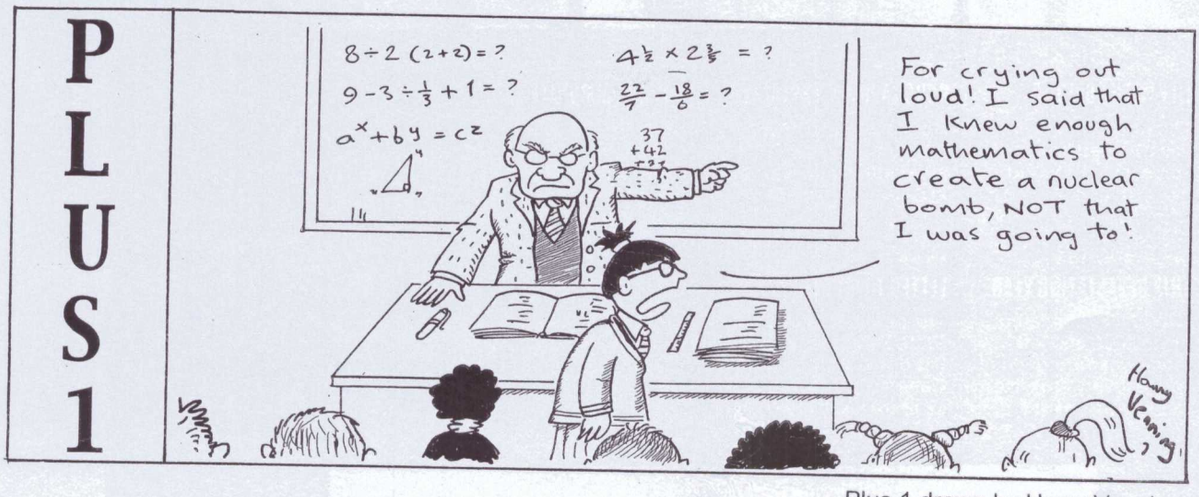

Plus 1 drawn by Harry Venning.

The cover photograph was taken by Simon Carey. He can be contacted at sdcarey@gmail.com.

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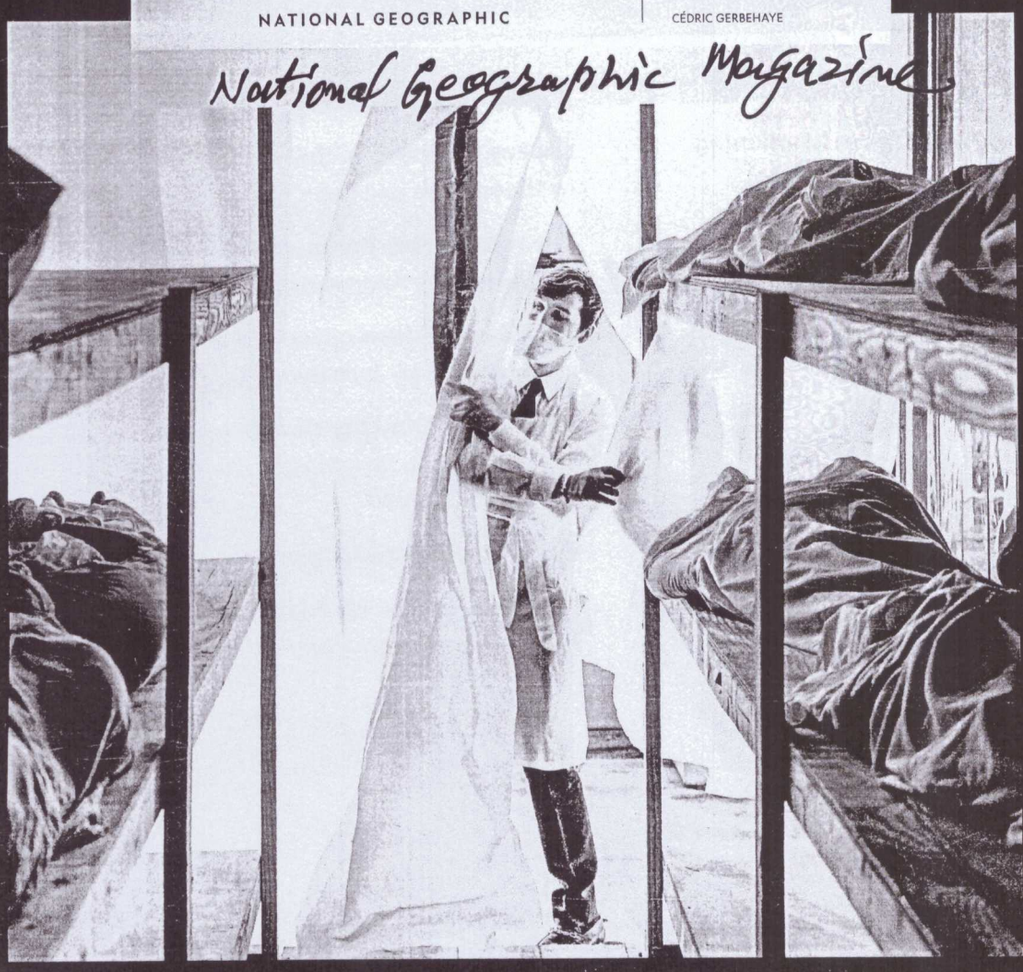
From a hospital in La Louvière, Belgium, this image shows a CT scan of the chest area and lungs of a 69-year-old patient with COVID-19.
CÉDRIC GERBEHAYE

National Geographic Magazine



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PETER VAN AGTMAEL, MAGNUM PHOTOS

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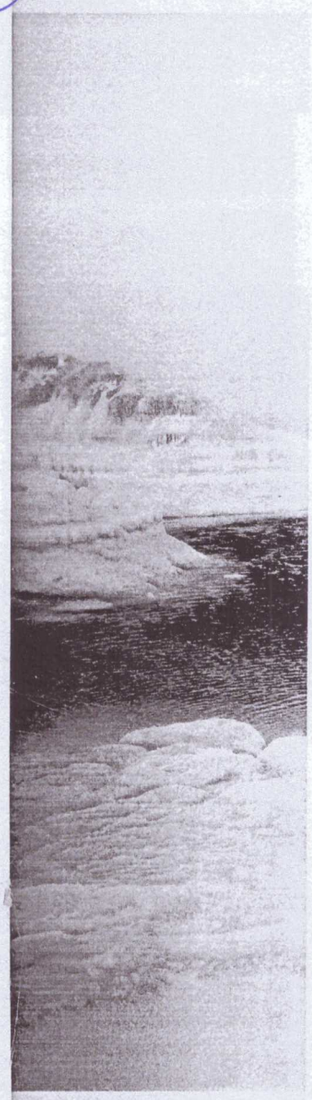

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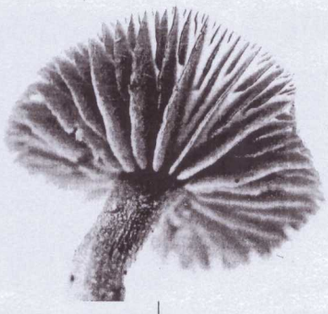

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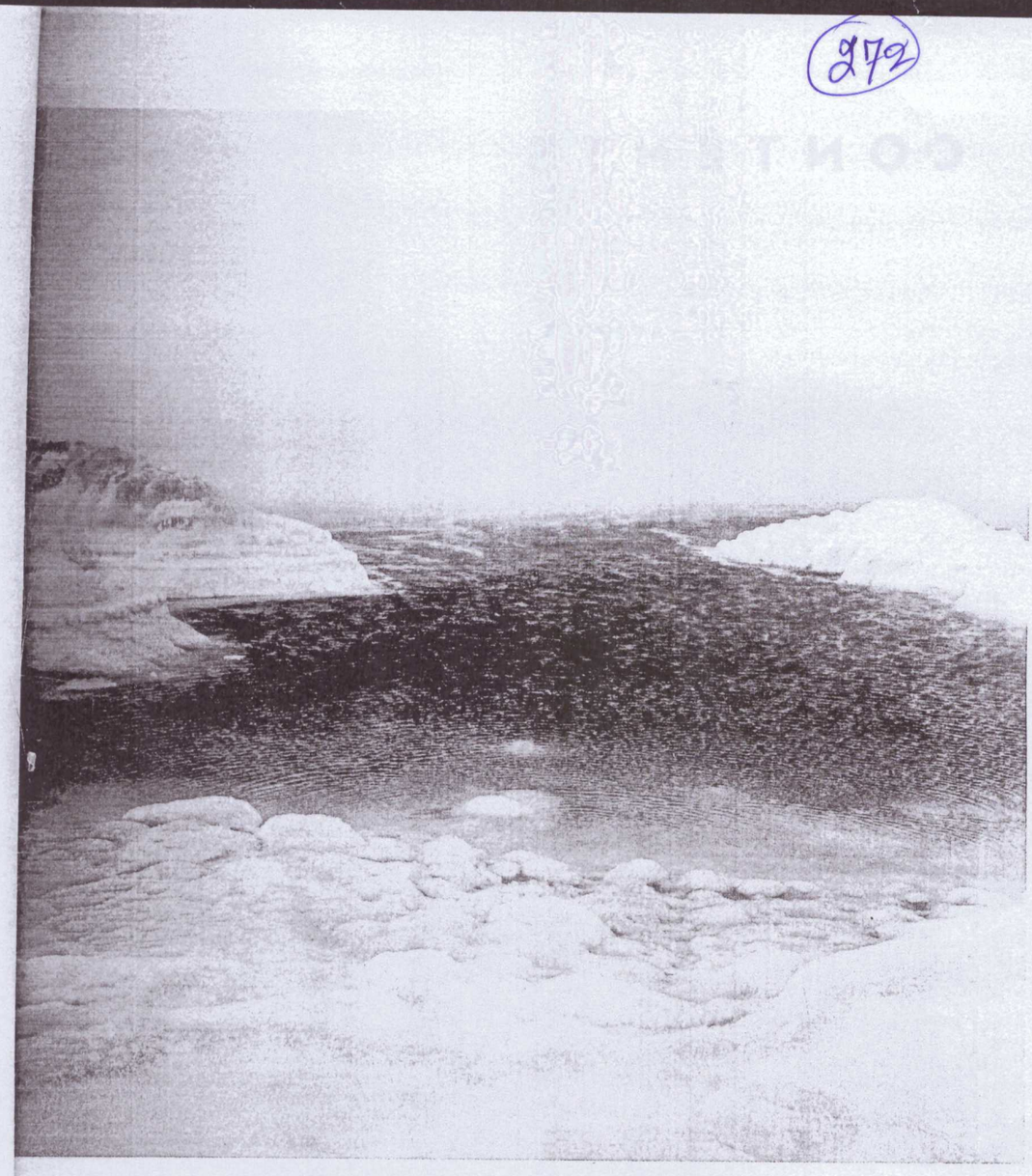



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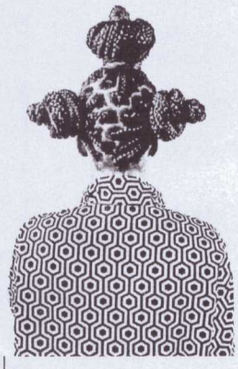

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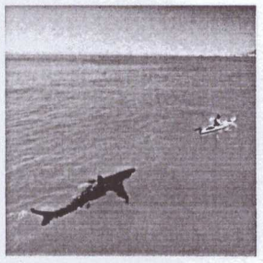

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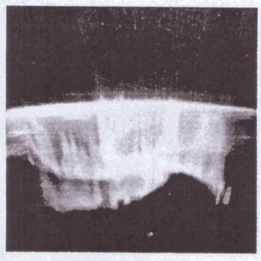

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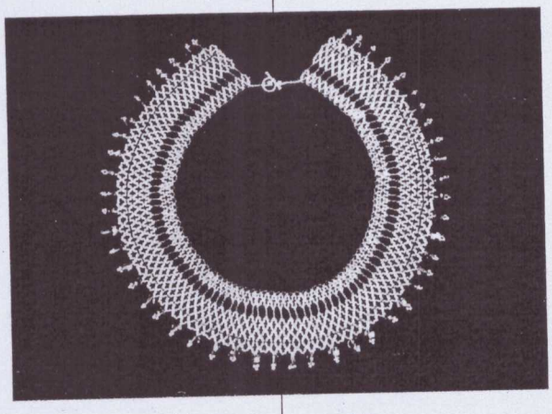

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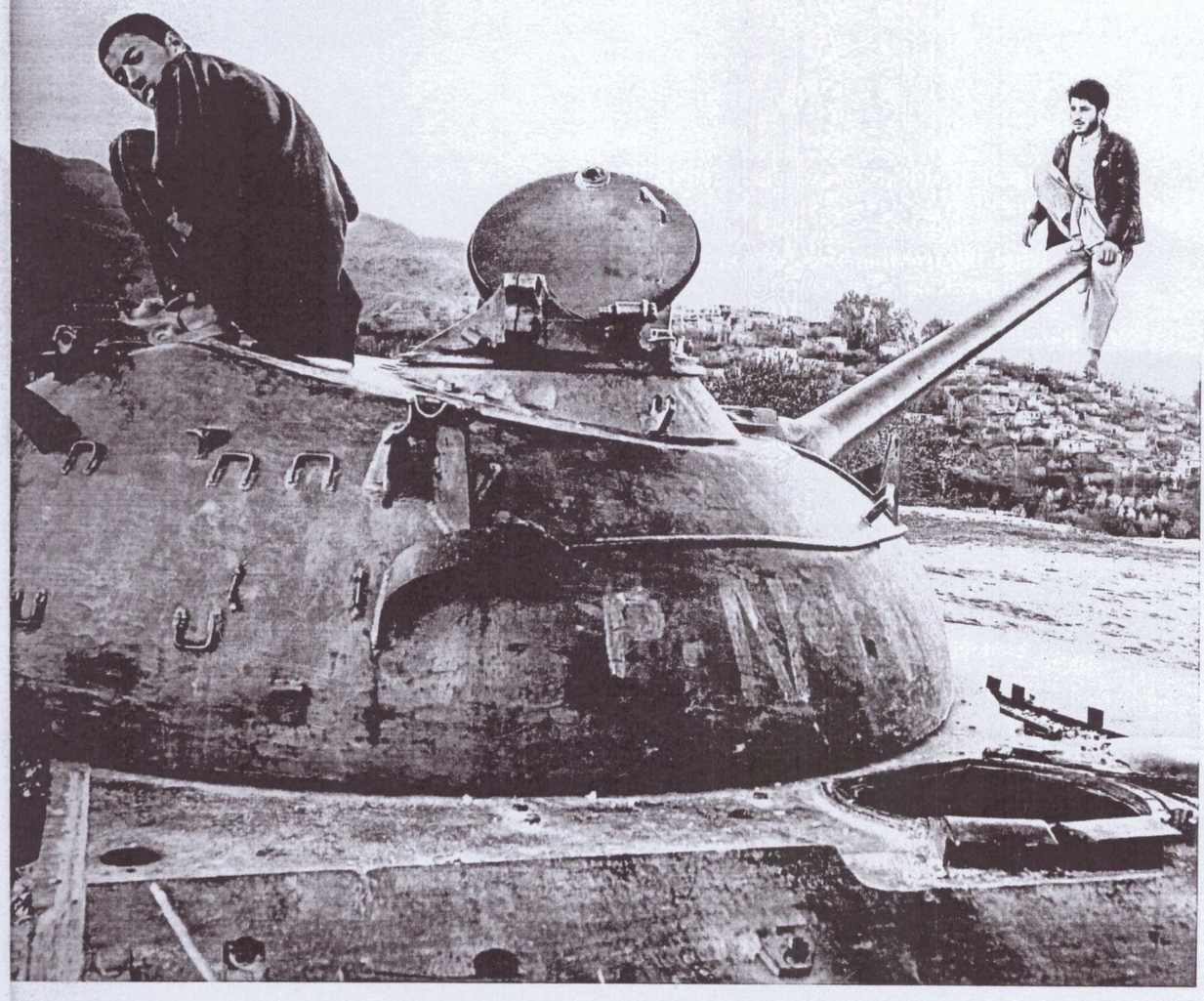

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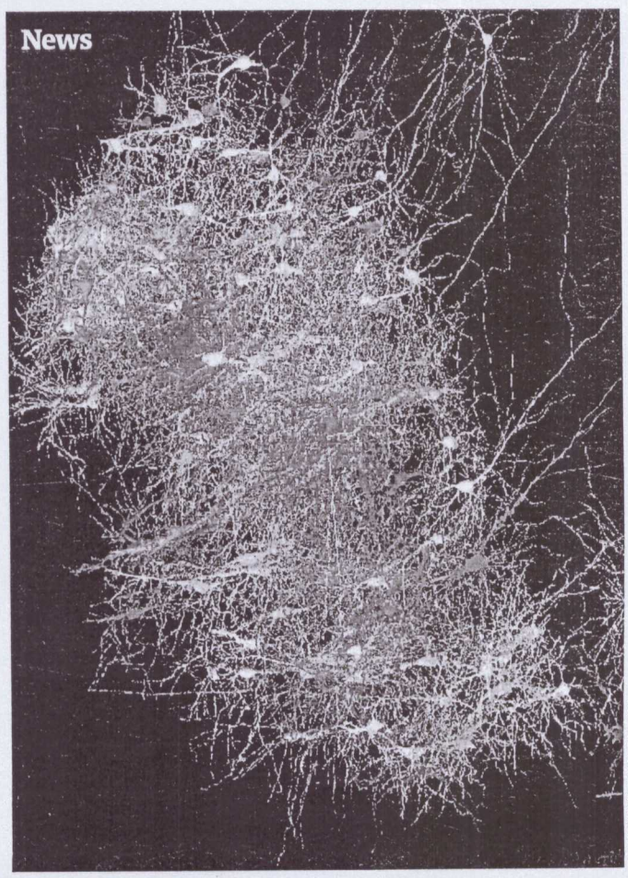

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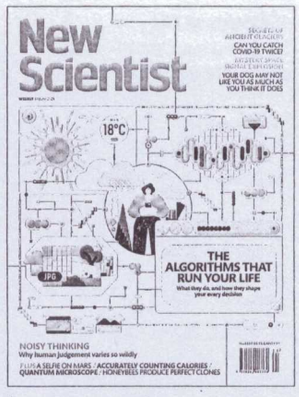

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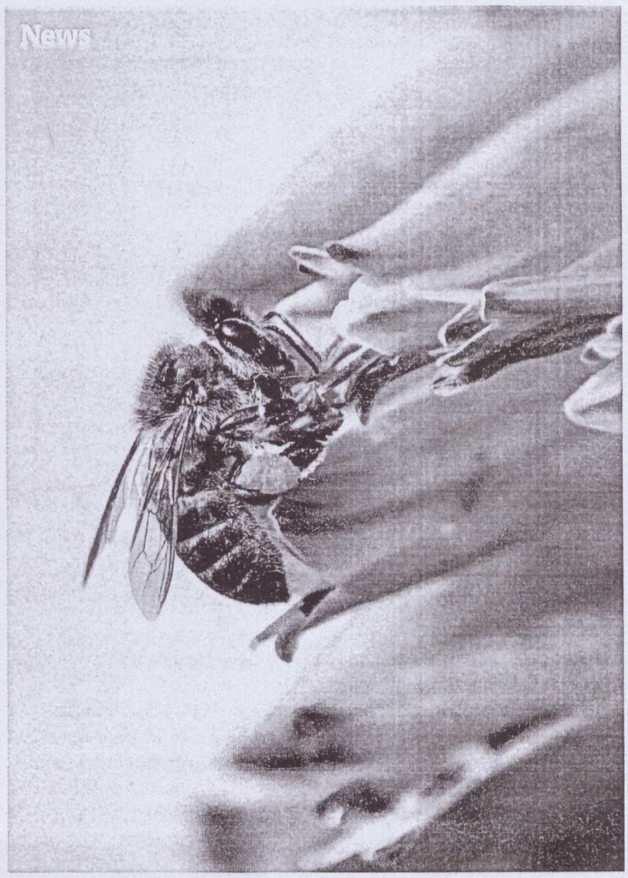

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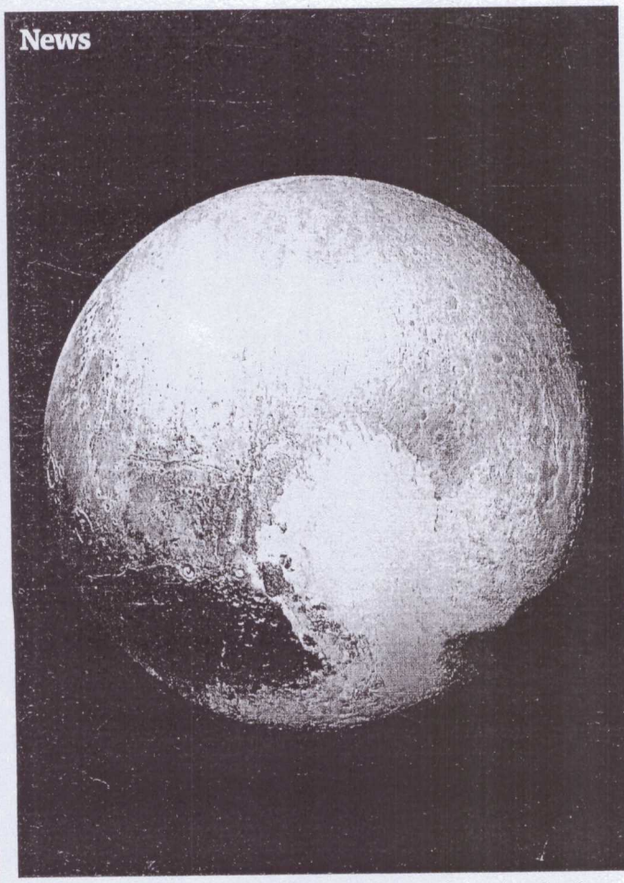

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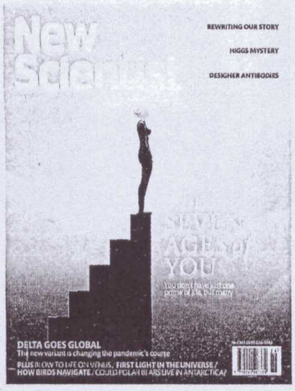

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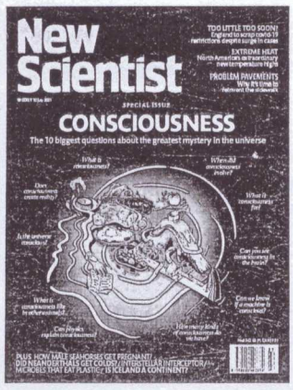

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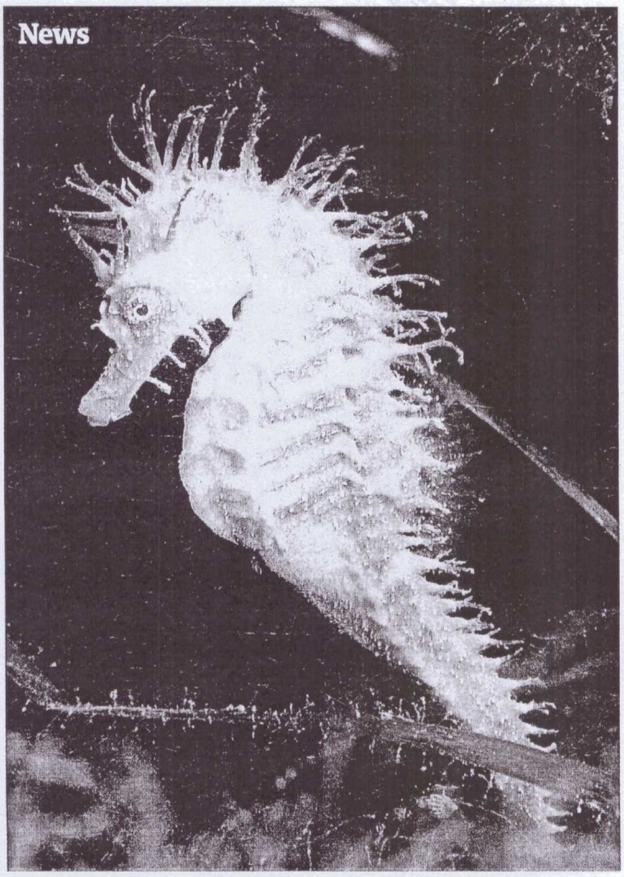

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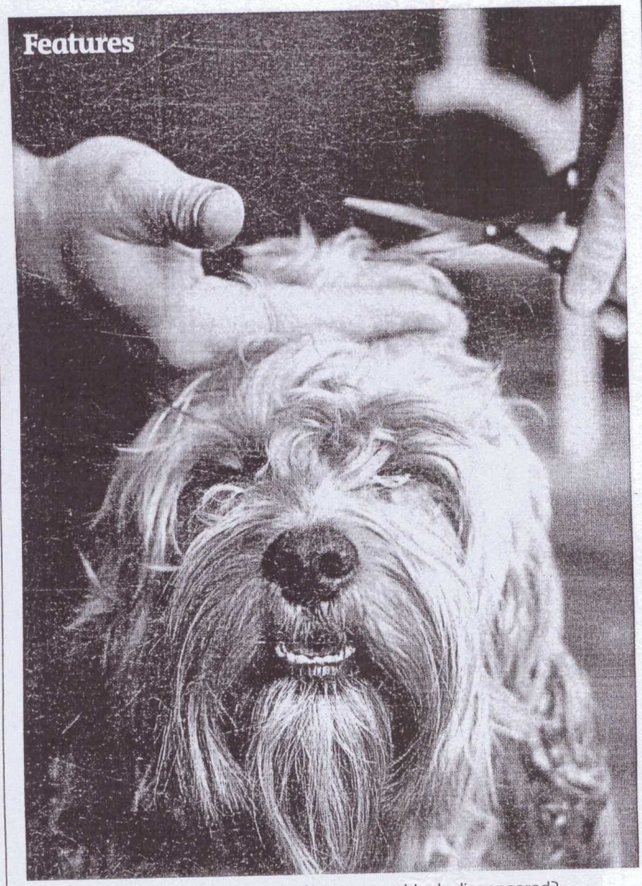

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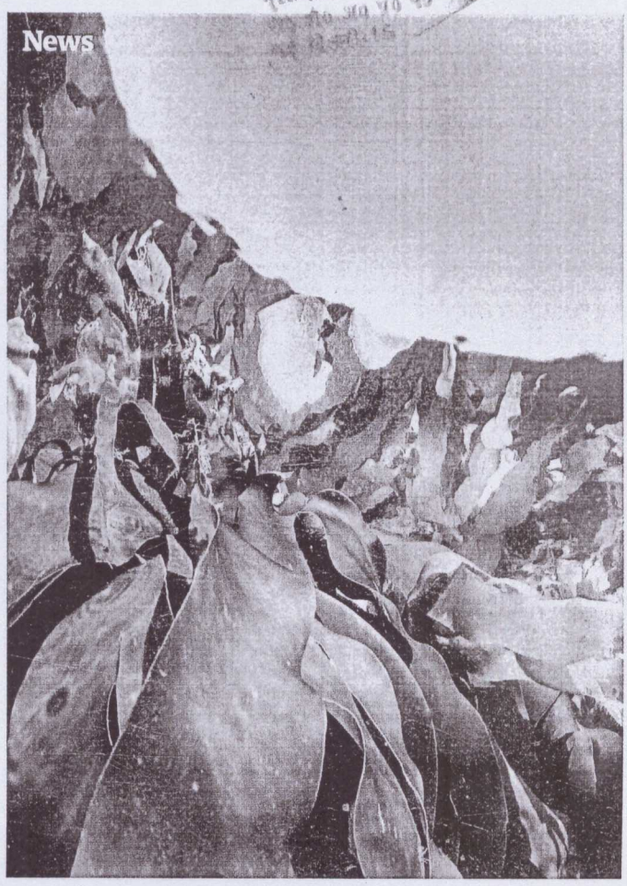

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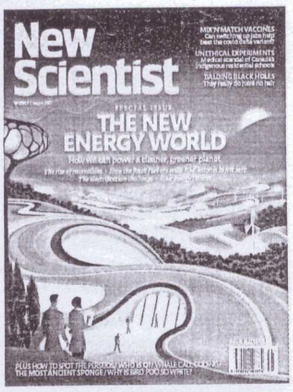

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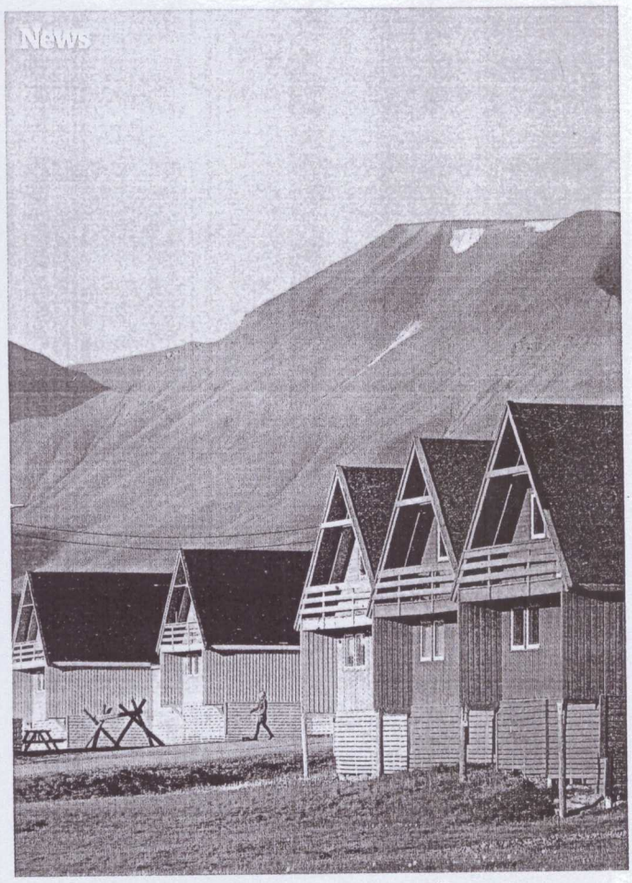

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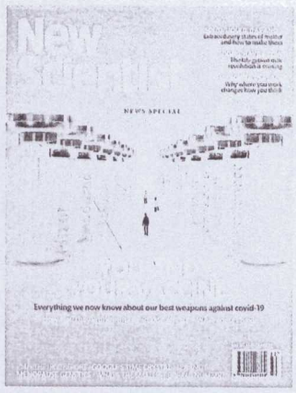

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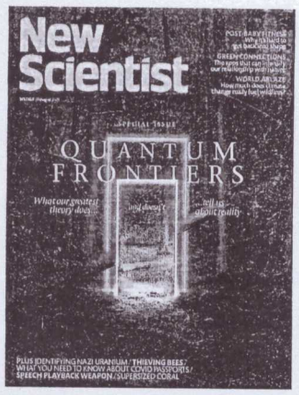

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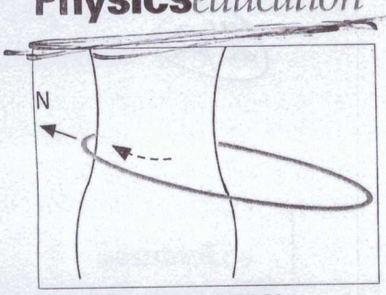

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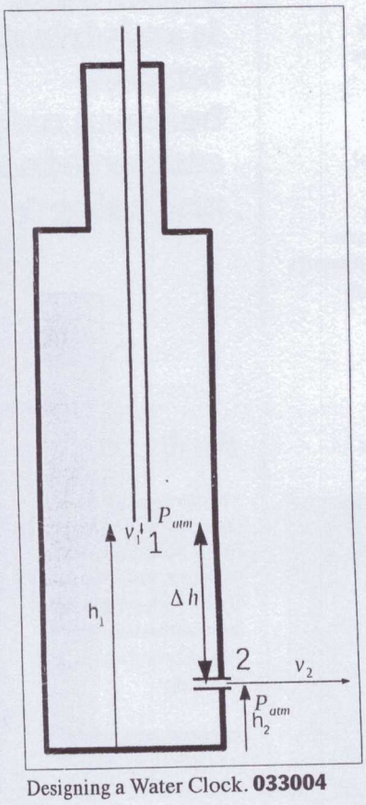

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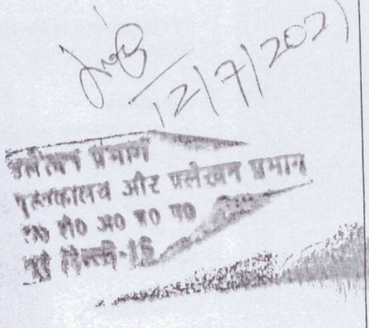

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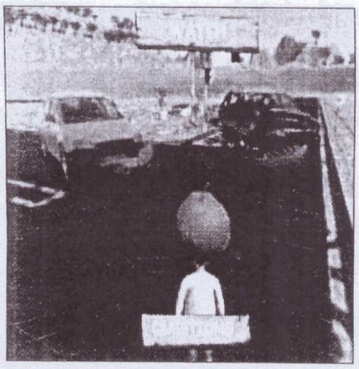

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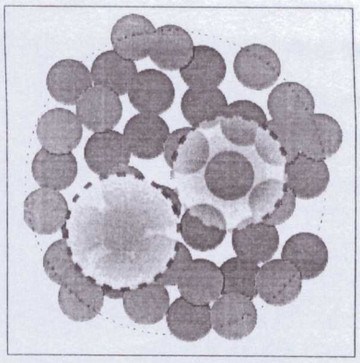

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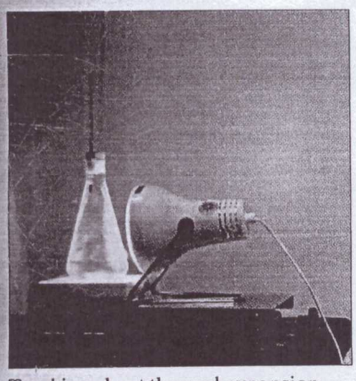

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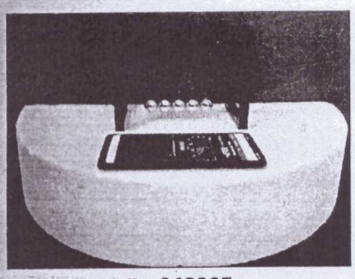

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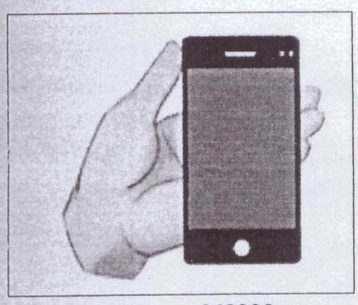

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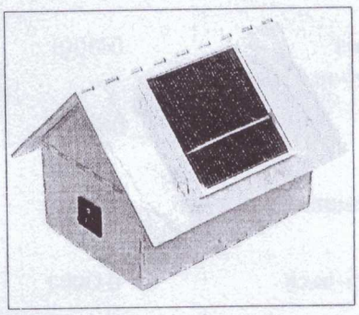

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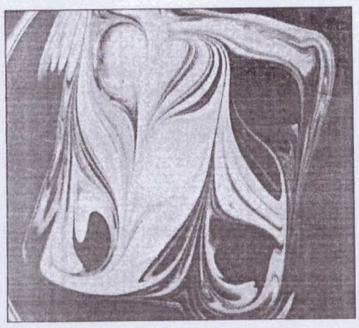

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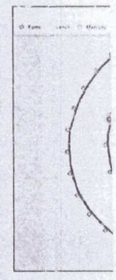

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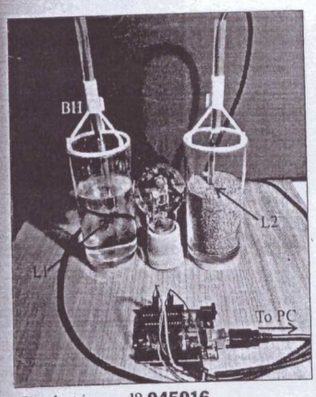

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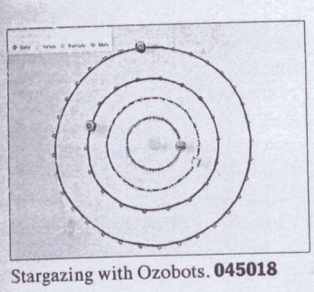

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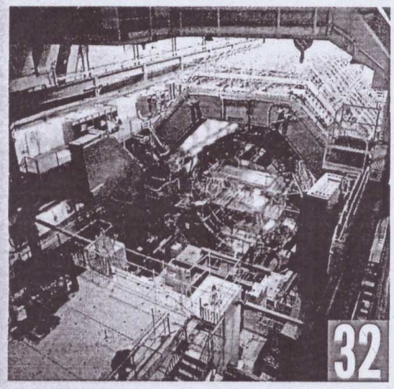





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A removable poster charts the positions in the sky of the *Hubble Space Telescope*'s plethora of cosmic targets.

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How the rhetoric of moderation has shaped the US government's approach to risk, from nuclear fear to climate policy.



ON THE COVER: Birds change the shape of their wings for different flight maneuvers. A team of biologists and engineers studying the phenomenon discovered that interlocking microstructures keep the feathers together. When the researchers constructed a biohybrid robot with real pigeon feathers, shown here, the microstructures prevented gaps from forming and limiting the robot's mobility. See the story on **page 20** to learn more about the feather fasteners. (Photo by Lentink Lab/Stanford University.)

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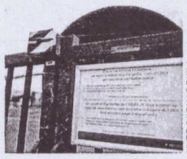

MIKE STRUIK/CERN

COVID-19 coverage

Visit www.physicstoday.org for frequent reports on the many impacts of the coronavirus pandemic on the physical sciences, from meeting cancellations and remote teaching and networking to the scaling back of activities at US national labs and scientific facilities around the world.

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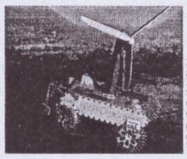

NASA/JPL-CALTECH

Crowdsourced rover

Those looking for a DIY project might consider NASA's latest crowd-sourced challenge: designing a mechanical sensor for a future Venus rover. The $30 000 contest is one of many the agency has offered to supplement the efforts of its in-house engineers.

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ALDA CENTER AT SBU

Avoiding jargon

Jargon leads laypeople to distrust content about science and to conclude that they are not good at—and don't like—the broader subject area, according to a recent study. The results can inform the efforts of those who communicate with students and the general public.

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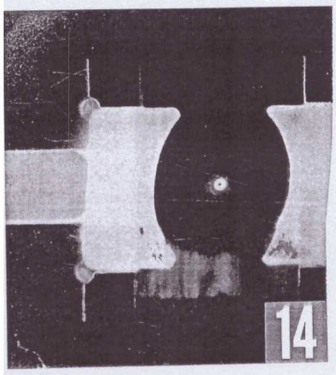

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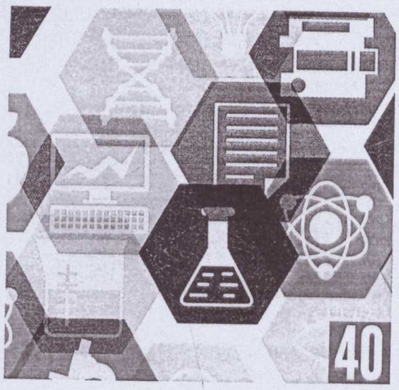



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Gradual falls and sharp rises in temperature for millions of years have profoundly affected living conditions on the planet and, consequently, our own evolution.



ON THE COVER: Wobbles in Earth's orbit have repeatedly caused the planet's temperature to drop and continental ice sheets to spread. Woolly mammoths, like the one depicted here, developed thick fur to insulate their bodies from the cold. The ice ages may have also affected human evolution and migration. To read more about Earth's temperature swings over time, see Mark Maslin's article on **page 48**. (Image by iStock.com/Daniel Eskridge.)

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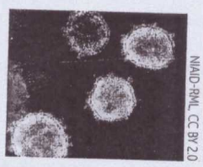

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Pandemic coverage

Visit www.physicstoday.org for continued coverage of the coronavirus pandemic's effects on the physical sciences. A recent story examines the obstacles facing graduate students, postdocs, and other early-career researchers who are seeking jobs in academia.

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HANNAH PELL

Three Mile Island

The 1979 nuclear accident at Three Mile Island was notable not only for its seriousness but also for the poor communication to the public during the crisis. Hannah Pell examines the missteps of four decades ago and offers some relevant lessons for today.

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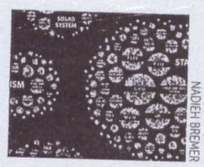

NADIEH BREMER

Hubble at 30

The *Hubble Space Telescope* has now spent more than 30 years in orbit. PHYSICS TODAY has produced a package of stories, along with infographics by award-winning designer Nadieh Bremer, that examine *Hubble*'s notable discoveries and famous images.

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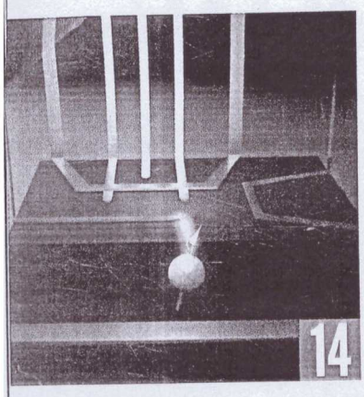

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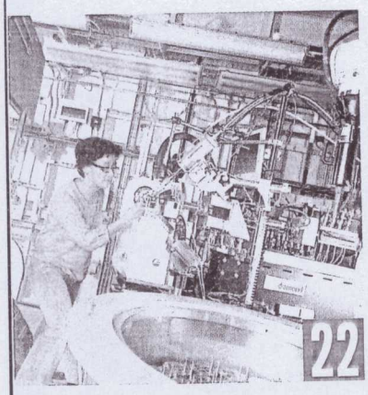

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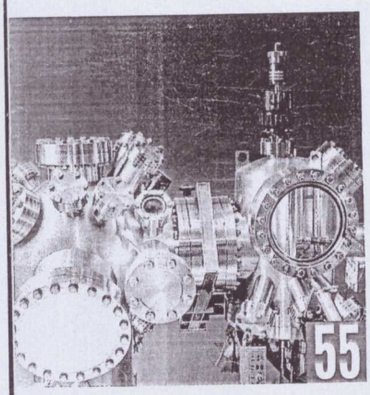

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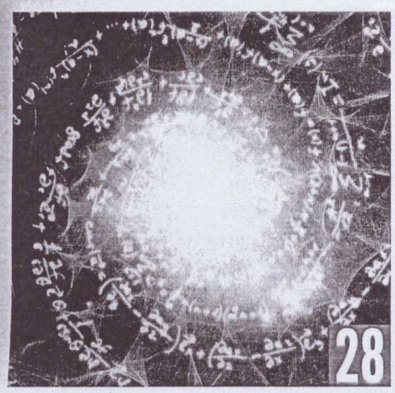

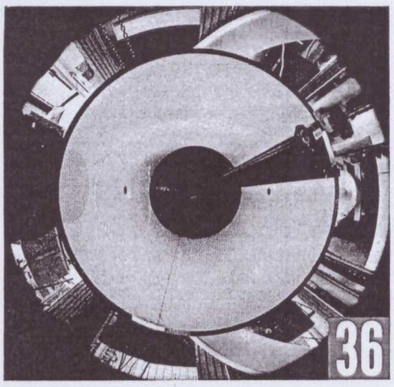

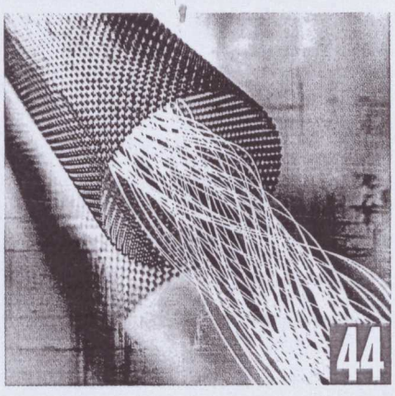

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Marco Polini and Andre K. Geim

Advances in materials science have made it possible for electrons in metals to exhibit exotic hydrodynamic effects.

36 Neutron scattering for structural biology

David P. Hoogerheide, V. Trevor Forsyth, and Katherine A. Brown

Modern neutron sources illuminate the complex functions of living systems.

44 Majorana qubits for topological quantum computing

Ramón Aguado and Leo P. Kouwenhoven

Researchers are trying to store robust quantum information in Majorana particles and are generating quantum gates by exploiting the bizarre non-abelian statistics of Majorana zero modes bound to topological defects.



ON THE COVER: With a height of 634 meters, the Tokyo Skytree broadcasting tower is the tallest structure in Japan. A team of researchers developing transportable atomic clocks used that height to put their clocks to the test. By placing one clock at the tower's base and the other at the observatory level, they precisely measured the relativistic frequency shift between the clocks. For more about the transportable clocks, see the story on **page 20**. (Sean Pavone/Alamy Stock Photo.)

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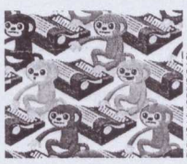

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Reality check

Mathematical reasoning leads to some befuddling possibilities, including the assembly of a Sun-sized sphere from a pea-sized one or a monkey churning out Hamlet on a typewriter. Alas, the real world gets in the way. Johanna Miller explains why in her latest column.

physicstoday.org/Jun2020a



COURTESY OF DAISY SHEARER

Autism ambassador

Last year physicist Daisy Shearer publicly shared her autism diagnosis on Instagram and began using social media to mentor and advocate for neurodivergent people in STEM fields. Shearer talks to PHYSICS TODAY about her experiences, her spintronics research, and her efforts to encourage inclusion.

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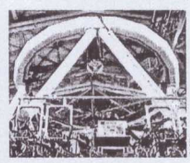

ESO

Distributed review

Under a policy called distributed peer review, applicants for research grants or telescope time evaluate each other's proposals. A recent trial found that reviewers judging fellow applicants gave proposal critiques similar to those by an independent group of peer reviewers.

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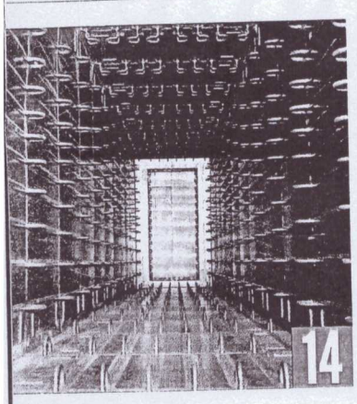

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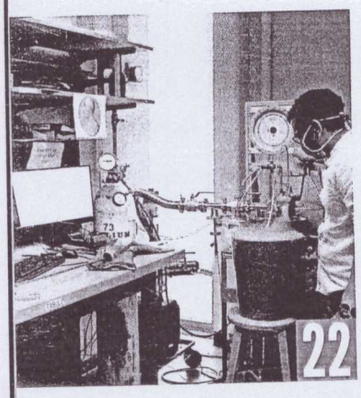

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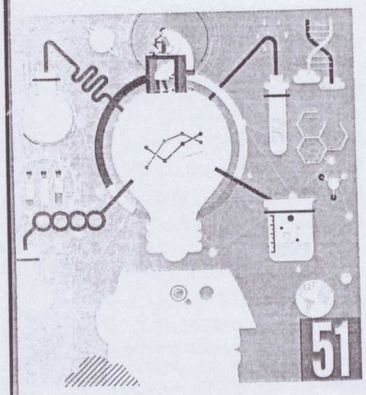
Self-propelled, emergent vortices



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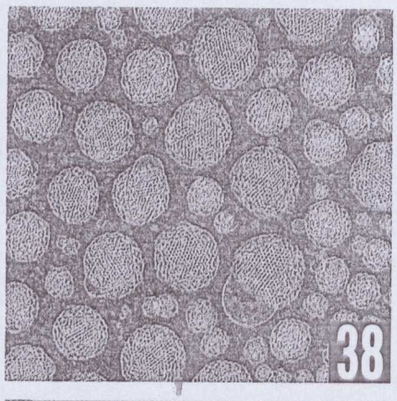

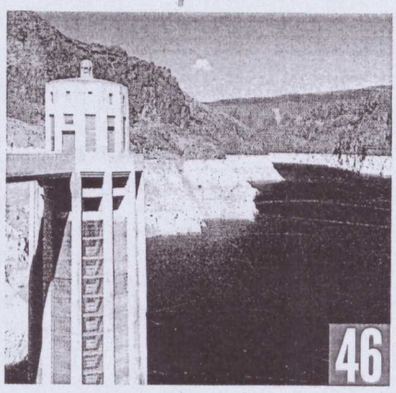

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30 Isaac Newton and the perils of the financial South Sea

Andrew Odlyzko

Despite Newton's general brilliance and his expertise in finance, groupthink led him to plunge into the South Sea Bubble and lose much of his fortune.

38 The physics of lipidic mesophase delivery systems

Simone Aleandri and Raffaele Mezzenga

Effectively releasing drugs in the body depends on the physical and chemical traits of a special class of liquid crystals.

46 The physics of river prediction

Sean W. Fleming and Hoshin V. Gupta

Resource managers use forecasts to ensure future access to abundant water and provide safety from river-related hazards.



ON THE COVER: Changes in rivers' flows can lead to destructive flooding or catastrophic famine. Those changes can happen over hundreds of years, like the meandering path of the Mississippi River, shown in this 1944 map, or they can take just a few hours, like in a flash flood. On **page 46**, Sean Fleming and Hoshin Gupta explain how researchers create hydrological models to understand river physics, manage water supplies, and inform public safety measures. (Harold Fisk/Army Corps of Engineers.)

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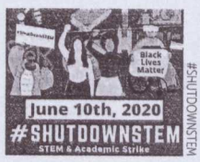
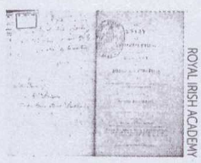


Combating racism

On 10 June scientists responded to the Strike for Black Lives and #ShutDownSTEM initiatives by spending the day learning about and discussing anti-Black racism and what to do about it. PHYSICS TODAY's coverage includes links to resources for sustaining the push for change.

physicstoday.org/forchange



Elizabeth Fulhame

In 1794 Elizabeth Fulhame postulated the mechanism of catalysis decades before the term was coined. Yet the Scottish chemist is rarely mentioned in histories of the period. Claire Jarvis profiles the trailblazing chemist and her defiance of a society that thought little of female scientists.

physicstoday.org/Jul2020a



BECs in space

An experiment aboard the International Space Station recently produced the first Bose–Einstein condensate in microgravity. Researchers report observation times of more than a second and unexpected BEC behaviors that could prove useful for applications such as high-precision spectroscopy.

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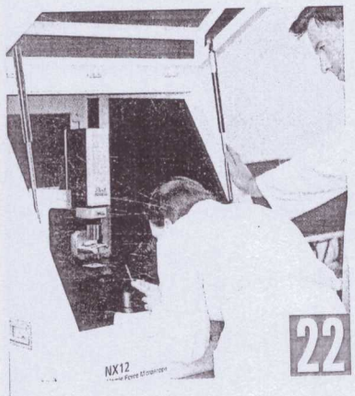

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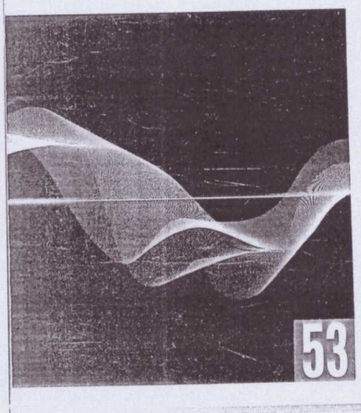

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Burning branches

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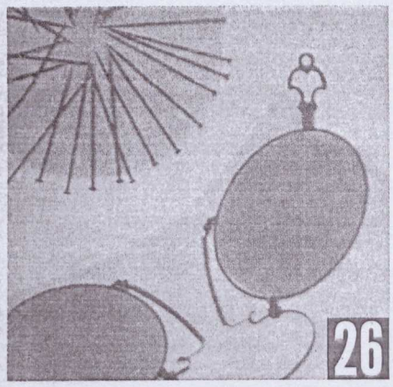

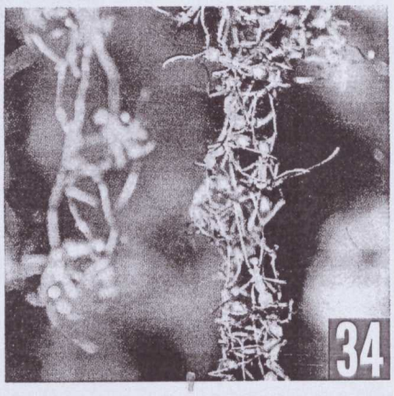

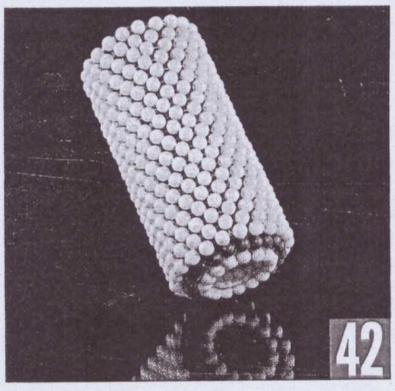

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John S. Cameron and Jacqueline Marie Musacchio

A team of women working in the physics laboratory at Wellesley College carried out some of the first successful x-ray experiments in the US.

34 Does new physics lurk inside living matter?

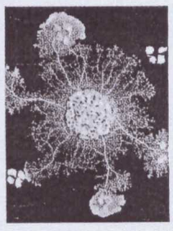
Paul Davies

The link between information and physics has been implicit since James Clerk Maxwell introduced his famous demon. Information is now emerging as a key concept to bridge physics and biology.

42 Nanotubes from layered transition metal dichalcogenides

Janice L. Musfeldt, Yoshihiro Iwasa, and Reshef Tenne

The two-dimensional materials form one- and zero-dimensional hollow structures with a host of promising mechanical, optical, and electrical properties.



ON THE COVER: At the cellular level, various physical mechanisms allow for signaling and can lead to cooperative behavior. Slime molds, like the one shown here, provide an example: They are aggregations of single cells that self-organize and behave coherently as if they were one organism. As Paul Davies discusses in his article on **page 34**, some physicists are bridging the conceptual gulf between physics and biology by incorporating the patterns of information flow into thermodynamic models. (Photo courtesy of Audrey Dussutour, CNRS.)

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Going GRE-free

Many universities are temporarily forgoing graduate applicants' GRE scores due to the pandemic. Independently, some departments have been dropping the test requirement permanently because of concerns that it leads to inequity in admissions and doesn't predict grad school success.

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Explosion monitor

What if the data from diverse geophysical instruments worldwide could be fused and analyzed for improved detection of explosions, particularly nuclear ones? Sarah Scoles describes the efforts of Los Alamos physicist Joshua Carmichael to create a reliable multiphysics explosion-detection model.

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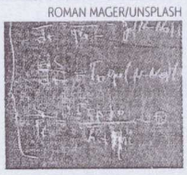
ROMAN MAGER/UNSPLASH



Racism in physics

Charles D. Brown II, a physicist at the University of California, Berkeley, recounts in a commentary the numerous instances of anti-Black racism and bias that he has experienced in physics and academia. He concludes with a call to hire, advocate for, and listen to Black scientists.

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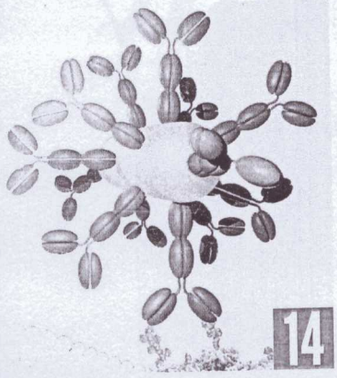

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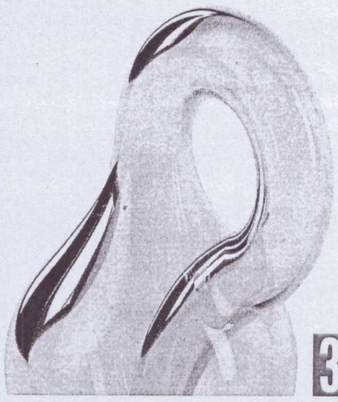

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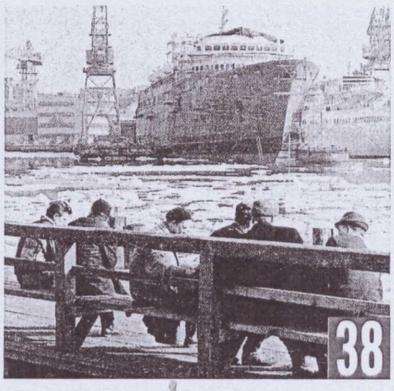

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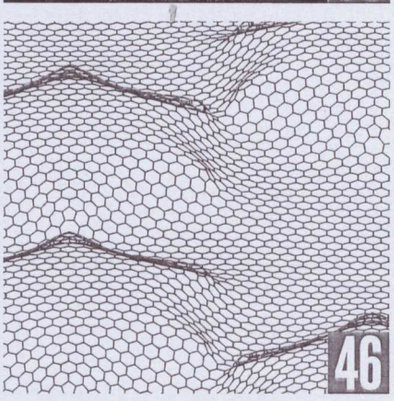

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FEATURES

30 Dawn of the topological age?

Arthur P. Ramirez and Brian Skinner

Nontrivial electron band structures may enable a new generation of functional materials.

38 Finnish–Soviet nuclear icebreakers

Saara Matala

During the Cold War, Eastern and Western manufacturers found good reasons to collaborate, even on a technology as sensitive as nuclear vessels.

46 Graphene gets bent

Bastien F. Grosso and Eugene J. Mele

Two-dimensional nanomaterials are bending the rules of the papercraft known as kirigami.



ON THE COVER: In his abstract geometric works, French painter Robert Delaunay (1885–1941) conveyed a sense of constant motion through intersecting disks and rhythmic, flowing bands of contrasting colors. As described in the article by Arthur Ramirez and Brian Skinner on **page 30**, similar motifs, including winding trajectories and intersecting bands of electrons, underpin the nature and potential promise of topological materials. And to learn how periodically modulating a topological system adds a new twist, turn to **page 14**. (Detail from *Rythme n°2, décoration pour le Salon des Tuileries*, 1938, Robert Delaunay. Image from Photo 12/Alamy Stock Photo.)

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WHITE HOUSE

ADA at 30

This summer was the 30th anniversary of the signing of the Americans with Disabilities Act. Although there is evidence of progress, science students and researchers with disabilities report having to constantly advocate for accommodations and equal access to information and spaces.

physicstoday.org/Sep2020a



AWI/MICHAEL GUTSCHE, CC BY 4.0

Icebound

For nearly a year, an icebreaker ship has floated along with the Arctic Ocean ice pack and allowed scientists to take surface, atmospheric, and undersea measurements that will become baseline data for future studies. Three participants describe the unique Mosaic project and the impact of the pandemic.

physicstoday.org/Sep2020b



NTI

Nuclear security

Improving the security of weapons-usable nuclear materials worldwide has slowed in the past two years, according to a recent report by the nongovernmental Nuclear Threat Initiative. (Its CEO, Ernest Moniz, is pictured.) PHYSICS TODAY's David Kramer outlines some of the vital gaps in security.

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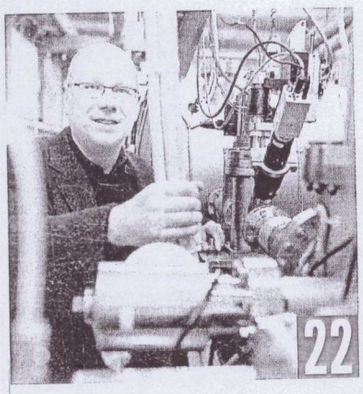

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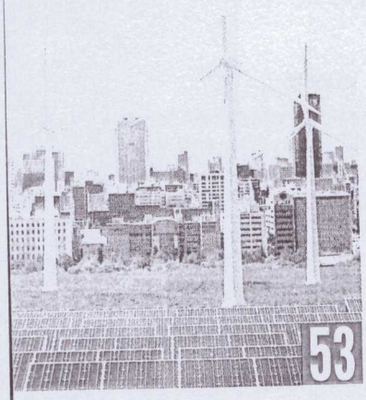

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PHYSICS TODAY

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CAREERS issue

30 Reflections on an academic job search

Omar S. Magaña-Loaiza

The road from reading a job posting to signing a contract is long and involved. Advice from a recently hired professor may smooth the path.

40 Where do new PhDs work?

Patrick J. Mulvey

Survey questionnaire data reveal that recently graduated physics PhDs have a varied set of career options.

52 So you want to hire a professor!

Matthew E. Anderson

The process for finding a new educator can be daunting, yet nearly every university goes through the same procedural steps. Here's a practical guide from the faculty side.



ON THE COVER: Our second annual careers issue focuses on early careers. On **page 40,** Patrick Mulvey of the American Institute of Physics surveys the initial employment of physicists who earned their PhD in 2017 and 2018. Two other features offer advice on how to land a type of job highly sought after by new PhDs: a tenure-track professorship. Matt Anderson of San Diego State University provides the perspective, on **page 52**, of a search committee member. Omar Magaña-Loaiza of Louisiana State University provides the perspective, on **page 30**, of a successful candidate. (Image by iStock.com/virtualphoto; adapted by Donna Padian.)

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CTIO/NOIRLAB/NSF/AURA/DELVE



Satellite trails

Light pollution from swarms of low-Earth-orbit satellites planned for launch by SpaceX and other companies could severely impede ground-based astronomical observations. A recent report from the American Astronomical Society and NSF's NOIRLab suggests measures to lessen it.

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BJOERN PENNING



Switching jobs

The pandemic and the attending economic downturn have added stress and uncertainty for many academic job seekers. PHYSICS TODAY's Toni Feder talks with several physicists who navigated the challenging process, including one who has yet to set foot on the campus of her new employer.

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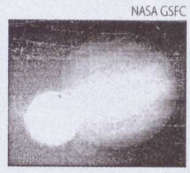
NASA GSFC



Survivor planet

A Jupiter-sized exoplanet that orbits a considerably smaller white dwarf has been spotted by NASA's *Transiting Exoplanet Survey Satellite*. The discovery leads to questions about how the planet survived the turbulent past of its host star, particularly the red-giant phase.

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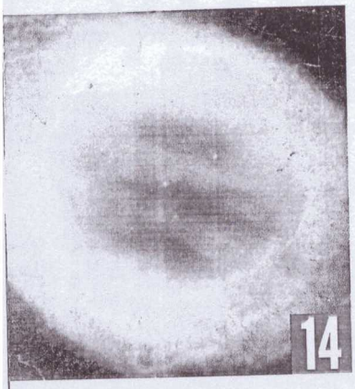

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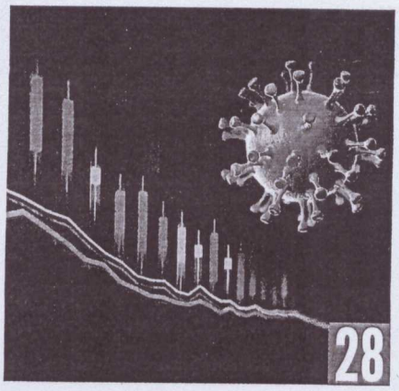

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Alison L. Hill

A few simple metrics characterize outbreaks like COVID-19, but calculating them correctly is surprisingly tricky.



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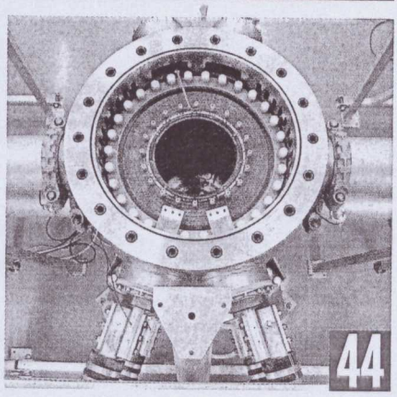
Daniel Helsing

The controversial best seller heralded the end of an era in science popularizations.



44 Magnetic field–boosted superconductivity

Anne de Visser

Although a magnetic field gradually destroys the superconducting state in most materials, a small family of uranium compounds bucks the trend.



ON THE COVER: Found on seabeds around the North Atlantic Ocean, the common starfish (*Asterias rubens*) is easily recognized by its familiar five-armed shape and rusty coloration. But starfish begin their lives as tiny, free-swimming larvae that look nothing like their adult form. To learn about how that life cycle makes starfish—and dozens of other species—especially vulnerable to climate change, see the story on **page 17**. (Image by Andrey Nekrasov/Alamy Stock Photo.)

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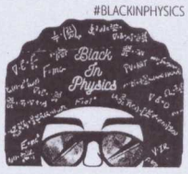

#BlackInPhysics Week

The last week of October was #BlackInPhysics Week, a series of events and initiatives hosted on social media that celebrated Black physicists and amplified their voices. The organizers of the week commissioned several essays that were published jointly by *Physics World* and PHYSICS TODAY.

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Black physicists

Jessica Esquivel, Sekazi Mtingwa, and a dozen other Black physicists in the US talked to PHYSICS TODAY about their work and their experiences in the field. They describe encountering racism at every career stage and having to prove themselves over and over. They also share ideas for achieving lasting change.

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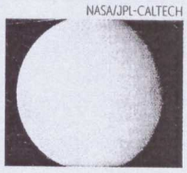

Phosphine on Venus

In the wake of the headline-grabbing finding of PH_3 in the clouds of Venus, Rachel Berkowitz reports on the next steps for confirming the detection and for understanding how the molecule could be produced, either biotically or abiotically, in the planet's still-mysterious atmosphere.

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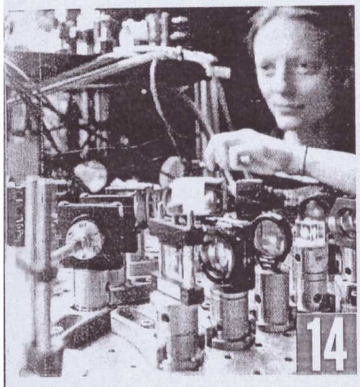



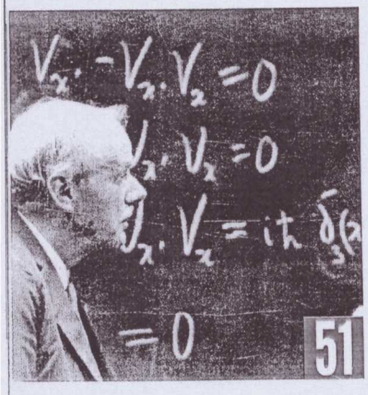

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PHYSICS TODAY

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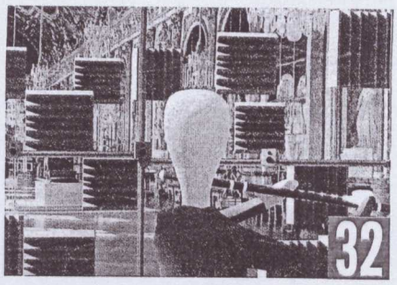

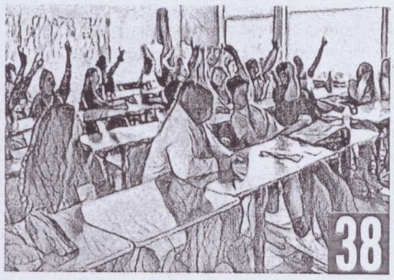





32 Exploring cultural heritage through acoustic digital reconstructions

Brian F. G. Katz, Damian Murphy, and Angelo Farina

Simulating the acoustics of destroyed or altered amphitheaters, cathedrals, and other architectural sites re-creates their sonic grandeur.

38 Ultrasound in air

Timothy G. Leighton

Experimental studies of the underlying physics are difficult when the only sensors reporting contemporaneous data are human beings.

44 Ocean acoustics in the changing Arctic

Peter F. Worcester and Megan S. Ballard

Recent changes in ice cover and ocean stratification have been so large that acoustic measurements made during the Cold War no longer reflect current conditions.

50 Computational phonogram archiving

Michael Blaß, Jost Leonhardt Fischer, and Niko Plath

A general approach to analyzing audio files makes it possible to re-create the sound of ancient instruments, identify cross-cultural musical properties, and more.



ON THE COVER: Experiences are often shaped by the sounds that accompany them. The mural shown here captures the joyful spirit of a jazz band leading a march for peace in East London in 1983. Although the soundtrack of that day now exists only in memory, acousticians are learning to preserve other aural experiences. On **page 32**, Brian Katz, Damian Murphy, and Angelo Farina discuss acoustic reconstructions of historical sites. And on **page 50**, Michael Blaß, Jost Leonhardt Fischer, and Niko Plath describe the re-creation of sounds from ancient instruments. (Detail from *Hackney Peace Carnival*, 1985, Ray Walker; image from marc zakian/Alamy Stock Photo.)

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TIAN LI/FONO

Gap year

After graduating with a bachelor's degree in physics last year, Chunyang Ding chose to pursue a job in industry rather than start graduate school right away. Ding argues in a commentary that although gap years aren't for everyone, they can provide valuable experiences for aspiring physical scientists.

physicstoday.org/Dec2020a



TRIUMF

New APS CEO

In January theoretical physicist Jonathan Bagger will become the CEO of the American Physical Society. In an interview he talks about remote meetings, the challenges and opportunities facing the organization and the physics community, and his priorities as he begins his new role.

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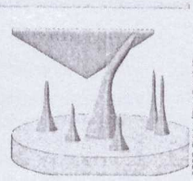

Z. SHI ET AL., PNAS 2020

Metallic diamond

Etching diamond into fine, 300-nm-wide needles transforms the normally inelastic, brittle material into a bendable form that can take on enormous stress. Now a study demonstrates that elastic strain can alter the bandgap of the diamond nanoneedles from that of an insulator to that of a metal.

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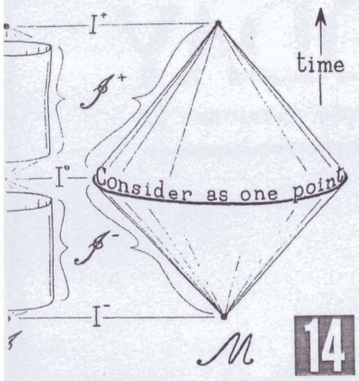

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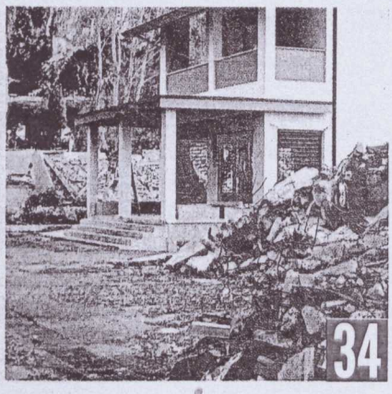

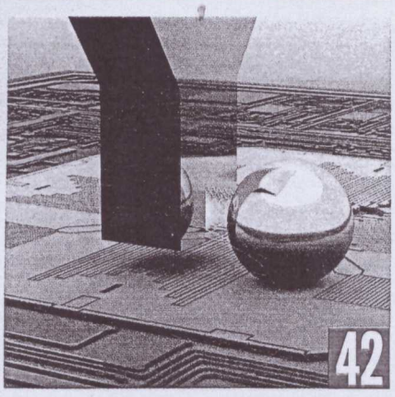

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26 S is for Science: The making of *3-2-1 Contact*

Ingrid Ockert

The beloved after-school show of the 1980s was the product of a then revolutionary idea: asking children what they wanted in a television science series.

34 Overlooked mechanisms behind seismic damage

Koji Uenishi

Photographs of aboveground and underground structural failures after earthquakes uncover simple but not widely recognized physics.

42 Science and technology of the Casimir effect

Alexander Stange, David K. Campbell, and David J. Bishop

Caused by simple fluctuations in space, the Casimir effect may validate theories of the cosmological constant and allow for measurements of ultrasmall magnetic fields.



ON THE COVER: Depicted in this woodblock print, the 1855 Ansei Edo earthquake caused widespread destruction in and around what is now Tokyo. Just how earthquakes damage buildings is the subject of the feature article by Koji Uenishi on **page 34**. The curious appearance of catfish in the print and others like it sprang from the myth that earthquakes and tsunamis are caused by the thrashing of giant, subterranean catfish. (Image from CPA Media Pte Ltd/Alamy Stock Photo.)

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PADANPAGANICUMMINGS

Best of 2020

Take a look at PHYSICS TODAY's most popular articles from last year, including several available only online. Topics include graduate departments' move away from the GRE, the growing discrepancy between Hubble-constant measurements, and the prevalence of anti-Black racism in the physics community.

physicstoday.org/Jan2021a



SPRINGER; HARVARD U PRESS

The year in books

PHYSICS TODAY editors look back at 2020 and compile a list of recommended books for enthusiasts of physics and history of science. Selections include a biography of astronomer Cecilia Payne-Gaposchkin, a survival guide for researchers, and a unique work that is part popular science, part history, and part memoir.

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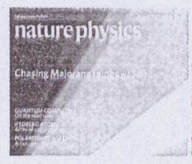

SPRINGER NATURE

Nature changes

Springer Nature recently announced policy changes for its *Nature* journals, including giving authors the option to make published papers freely available immediately. Dalmeet Singh Chawla examines the connection to Europe's Plan S open-access initiative and researchers' concerns over article fees.

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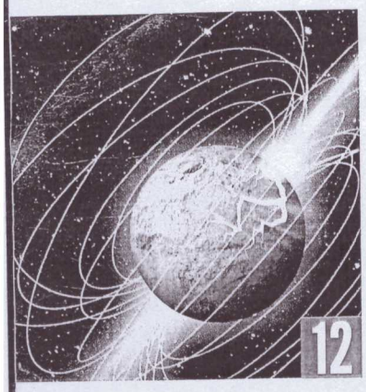

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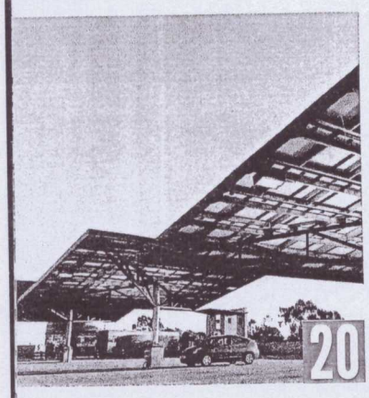

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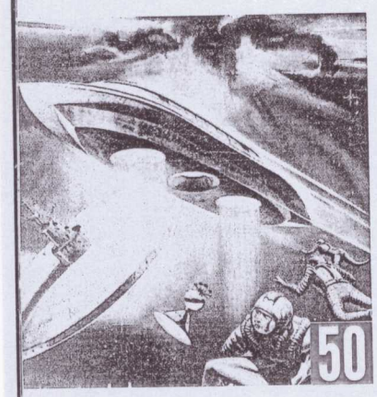

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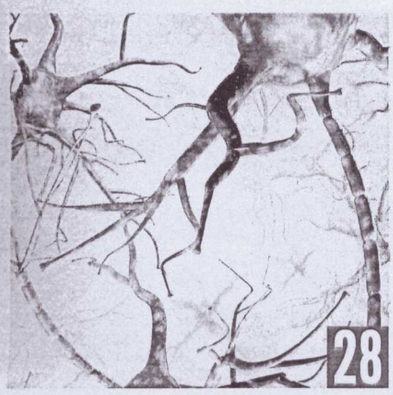
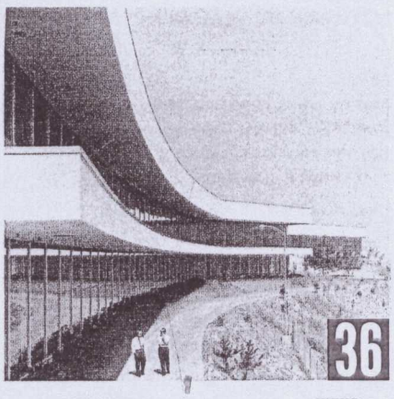


28 Magnetic fields for modulating the nervous system

Michael G. Christiansen and Polina Anikeeva

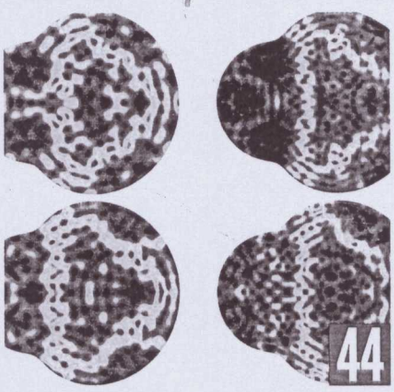
Although targeted actuation of neurons via magnetic fields may benefit neuroscience research and medicine, some approaches have sparked controversy.



36 California dreamin'

Stuart W. Leslie

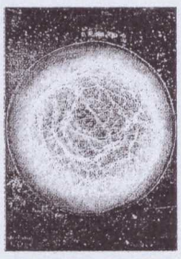
Defense projects made the West Coast the promised land for US physicists after World War II—until the projects dried up.



44 Relativistic quantum chaos in graphene

Hong-Ya Xu, Liang Huang, and Ying-Cheng Lai

Classical chaos gains some additional degrees of freedom in materials with excitations described by the Dirac equation.



ON THE COVER: When a drop of diluted bourbon evaporates on a glass coverslip, the residual solids can leave behind an intricate weblike pattern. For a web to form, the drop's alcohol concentration typically must fall in the range of 20–25% alcohol by volume (ABV). The "whiskey web" shown here comes from a 12-month-old sample at 20% ABV, manufactured by Brown-Forman Corp. For a discussion of the fluid dynamics behind such patterns, turn to the Quick Study on **page 62**. (Image courtesy of Stuart J. Williams, University of Louisville.)

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DAVID CANNON PHOTOGRAPHY

Undergrad physics

In 2008 Effrosyni Seitaridou joined Emory University's Oxford College in Georgia as the only tenure-track physics professor. In a recent essay, she describes how she bolstered the college's physics department by developing a clear mission statement and offering students research opportunities and meaningful advising.

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Transient tracking

Astronomers in South Africa are developing a telescope network that will quickly and automatically observe transient objects, such as fast radio bursts, that are detected by other observatories. The project could gain importance once the Vera C. Rubin Observatory in Chile begins its high-resolution sky survey next year.

physicstoday.org/Feb2021b



UNESCO

US and UNESCO

Many scientists and policymakers hope that the Biden administration will rejoin not only the Paris climate agreement and the World Health Organization but also UNESCO, PHYSICS TODAY's Toni Feder reports. The international group's initiatives address such issues as biodiversity, sustainability, and open access to science.

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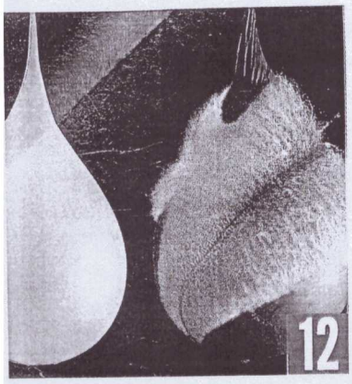

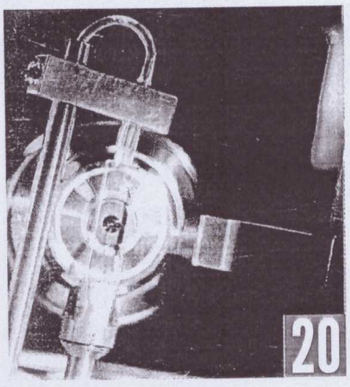



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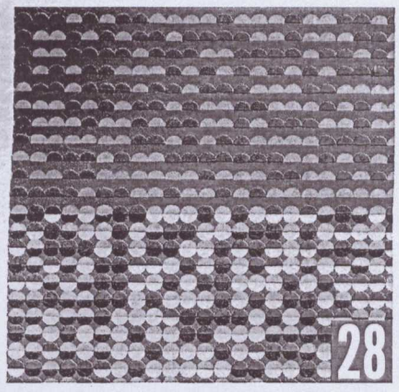

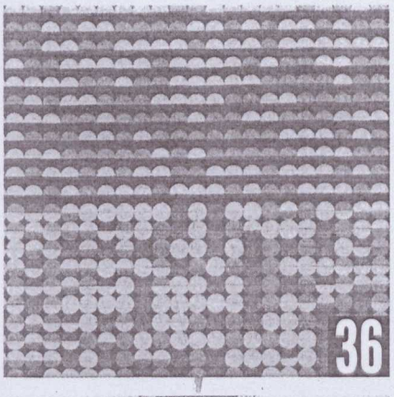



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March 2021 | volume 74 number 3

FEATURES

SPECIAL FOCUS ON QUANTUM INFORMATION

28 Quantum firmware and the quantum computing stack

Harrison Ball, Michael J. Biercuk, and Michael R. Hush

Integrated quantum-control protocols could bridge the gap between abstract algorithms and the physical manipulation of imperfect hardware.

36 A quantum leap in security

Marcos Curty, Koji Azuma, and Hoi-Kwong Lo

One-photon and two-photon interferences have recently led researchers to develop new classes of quantum cryptographic protocols.

42 The three physicists

Chris DeWitt, José Edelstein, and Bayram Tekin

Since 1951, the Prize of the Three Physicists has been awarded by the École Normale Supérieure in honor of Henri Abraham, Eugène Bloch, and Georges Bruhat—successive directors of the university's physics laboratory. These are their stories.



ON THE COVER: Placing an atom in one arm of an interferometer destroys the sinusoidal pattern that photons ordinarily produce. But, as artist Geraldine Cox depicts here, overlapping measurements of the atom's spin and the photon states reveal a hidden pattern. On **page 28**, Harrison Ball, Michael Biercuk, and Michael Hush discuss robust manipulation of information in quantum computing, and on **page 36**, Marcos Curty, Koji Azuma, and Hoi-Kwong Lo describe how to encode it for quantum cryptography. (*Illumination*, by Geraldine Cox, oil on canvas, 182 x 146 cm; http://www.findingpatterns.info.)

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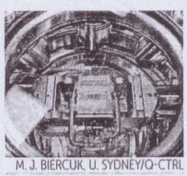


M. J. BIERCUK, U. SYDNEY/Q-CTRL

Quantum computers 101

The article on page 28 delves into quantum firmware, a crucial component for effectively manipulating qubits in a quantum computer. As described by PHYSICS TODAY's Christine Middleton, it's one of multiple layers of software abstraction that connect the physical qubit hardware and the user interface.

physicstoday.org/Mar2021a

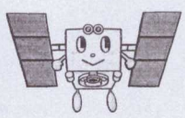


SUSAN COLLINS

Science & society

Sociologist Harry Collins has long specialized in studying scientists. He talks to PHYSICS TODAY's Toni Feder about his early work tracking the transfer of knowledge among scientists, his shift to studying the role science plays—and should play—in society, and his current focus on remote meetings.

physicstoday.org/Mar2021b



JAXA

SciComm in Japan

The sharing of science in Japan revolves around press clubs, clearinghouses through which most news in the country, scientific or otherwise, gets filtered, writes Amanda Alvarez. She also describes the whimsical side of Japanese science dissemination, which uses mascots and manga to make research accessible.

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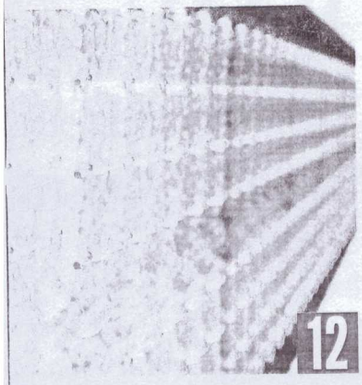

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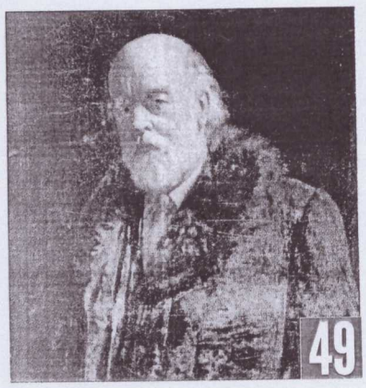
Prevailing surface patterns



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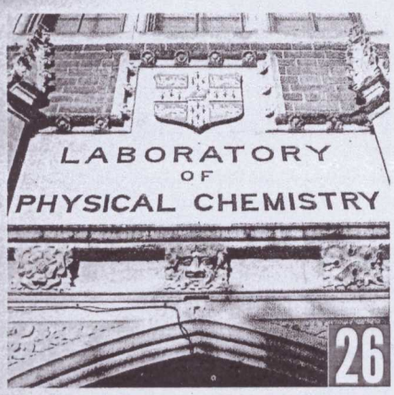

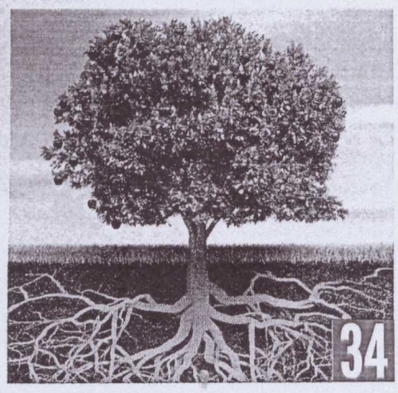



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26 Ernest Rutherford's ambitions

Melinda Baldwin

One of the pioneers of radioactivity research, Rutherford feared his work would be overlooked—and changed his publishing strategies to make sure it wasn't.

34 Why are theorists excited about exotic nuclei?

Filomena M. Nunes

The limits of nuclear stability provide deep insights into the fundamental force responsible for the presence of matter.

42 Inducing new material properties with hybrid light–matter states

Cyriaque Genet, Jérôme Faist, and Thomas W. Ebbesen

Even in the absence of light, coupling cavities with molecules and materials can modify their chemical reactivity, conductivity, and more.



ON THE COVER: Similar to humans who struggle to understand a conversation at a noisy gathering, frogs in loud environments sometimes misidentify vocalizations in their vicinity. Some frogs, including the red-eyed tree frog from Central America, shown here, solve the cocktail party problem by having males make their calls louder than the background noise. But female green tree frogs dampen the cacophony around them by inflating their lungs. To learn more about frog acoustics, see the story on **page 17**. (Photo by iStock.com/alptraum.)

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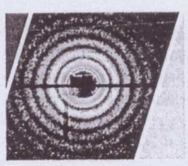

APS March Meeting

In 2020 the American Physical Society canceled its March Meeting because of coronavirus concerns. This year the meeting went virtual. PHYSICS TODAY's Paul Guinnessy interviewed a range of attendees, who recounted their mixed but generally favorable experiences.

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YUYA MAKINO, ICECUBE/NSF

Glashow resonance

More than 60 years ago, Sheldon Glashow predicted that the collision of an electron with an energetic electron antineutrino could form a negatively charged W boson. Now the IceCube collaboration has reported, with a confidence level above 2σ, results consistent with such an event.

physicstoday.org/May2021b



RENSSELAER POLYTECHNIC INSTITUTE

Black in the ivory

Rensselaer Polytechnic Institute president Shirley Ann Jackson was the second Black woman in the US to earn a PhD in physics and has since been a leading researcher and policy expert. In an interview, she talks about her experiences as an undergraduate and graduate student at MIT.

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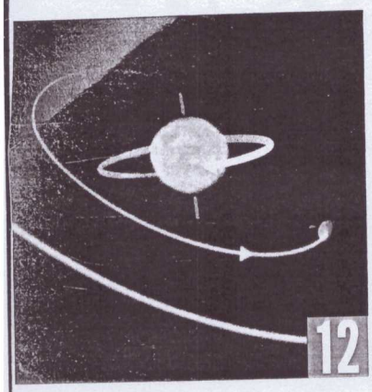

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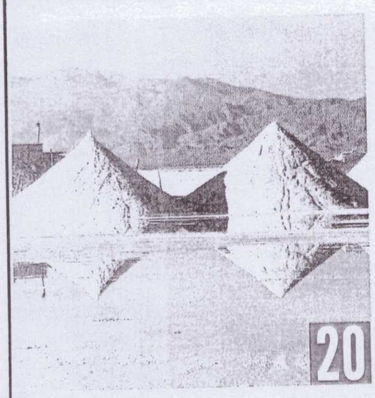

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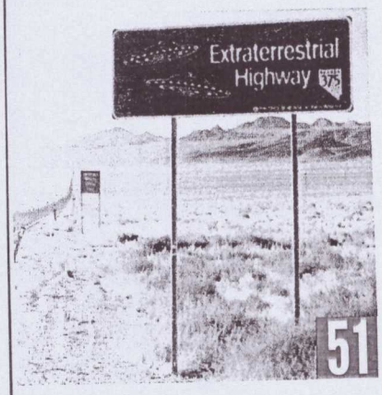

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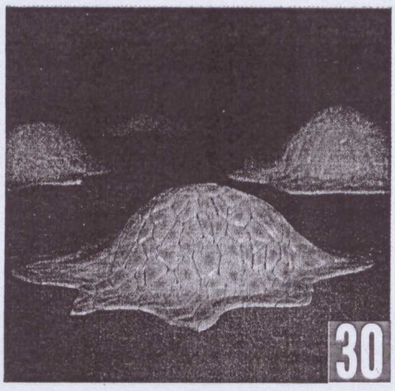

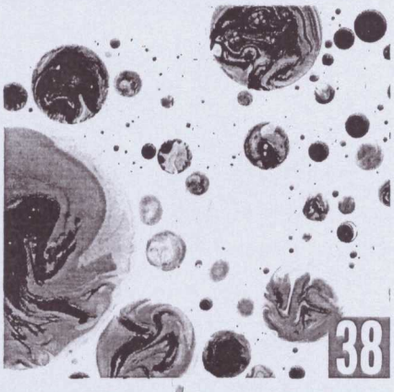



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Ricard Alert and Xavier Trepat

Spectacular collective phenomena, such as jamming, turbulence, wetting, and waves, emerge when living cells migrate in groups.

38 Drops in cells

Christoph A. Weber and Christoph Zechner

Liquid droplets act as microreactors. Can they also serve as a control mechanism for cellular biochemistry?

44 Accelerating progress in climate science

Tapio Schneider, Nadir Jeevanjee, and Robert Socolow

Interdisciplinary teams that integrate theory, data, and computing can now produce urgently needed, action-oriented climate science.



ON THE COVER: This optical micrograph shows a cross section of finger-like projections, known as villi, from the uppermost part of a mammalian intestine. The inner surface of the intestine renews itself every three to five days as epithelial cells migrate from the bottom to the top of the villi, where they are shed into the intestine and discarded. For more on collective cell migration in living tissue, turn to the article by Ricard Alert and Xavier Trepat on **page 30**. (Image by Steve Gschmeissner/Science Photo Library.)

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BROOKHAVEN NATIONAL LABORATORY

Moving for muons

The much-anticipated result from the Muon $g - 2$ experiment (see page 14) was made possible by transporting a massive superconducting magnet from New York to suburban Chicago in 2013. PHYSICS TODAY chronicles the voyage and the subsequent work that enabled the recent muon measurement.

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LANELL WILLIAMS

Equity in science

Women of color often face discouragement and hostile environments in STEM. Bryné Hadnott reports on how such experiences inspired Harvard University graduate student LaNell Williams to found the Women+ of Color Project, which is devoted to increasing representation in STEM PhD programs.

physicstoday.org/Jun2021b



JENNIFER JO PIZZA/NOAA

Arctic research

David Kennedy was recently appointed chair of the US Arctic Research Commission, a body that advises the White House and Congress. He talks to PHYSICS TODAY's Toni Feder about his decades spent in the Arctic and the challenges faced by its ecosystem and the Indigenous people who live there.

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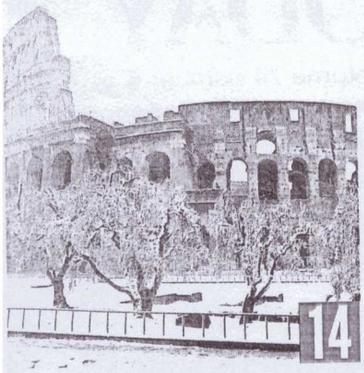

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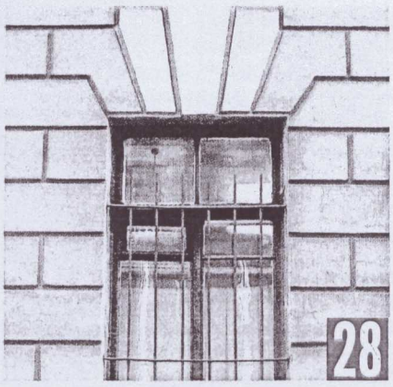

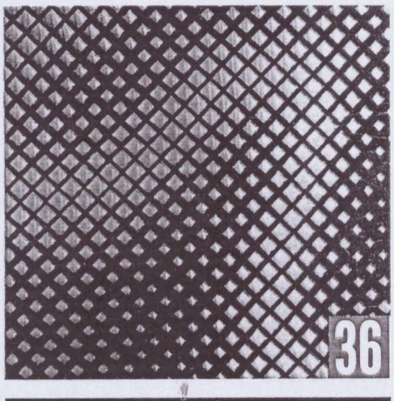

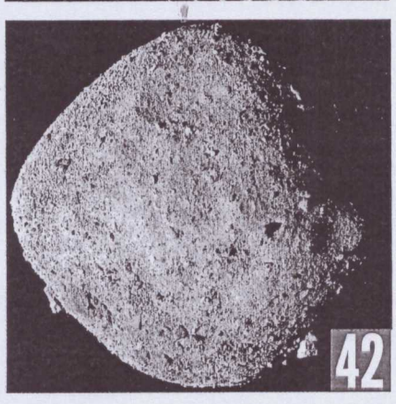

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Robynne Mellor

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Weinan E, Jiequn Han, and Linfeng Zhang

By integrating artificial intelligence algorithms and physics-based simulations, researchers are developing new models that are both reliable and interpretable.

42 Asteroids in the inner solar system

Sarah Greenstreet

Observations and computer simulations of their orbits and interactions with planets yield insights into the asteroids' dynamic lives.



ON THE COVER: This x-ray fluorescence image shows chemical elements in live seedlings of the nickel hyperaccumulator plant *Berkheya coddii*. Calcium appears in red, nickel in green, and potassium in blue. Hyperaccumulators extract nickel, cobalt, and other metals from certain soils and incorporate them into their biomass. To find out how the Advanced Research Projects Agency–Energy is exploring the plants' potential to sustainably mine metals that are critical to clean-energy technologies, turn to the story on **page 24**. (Image courtesy of Antony van der Ent/University of Queensland.)

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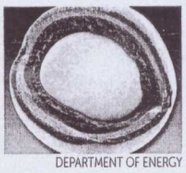

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Army microreactors

The Department of Defense is developing small nuclear reactors that can be airlifted to army bases in conflict zones. The National Academies of Sciences, Engineering, and Medicine and a nuclear nonproliferation advocacy organization have raised concerns over the program's necessity and safety.

physicstoday.org/Jul2021a



DENNIS WISE/UW

Women in biophysics

Among US physics PhD recipients, women are about twice as likely to do a dissertation in biophysics as men. PHYSICS TODAY's Toni Feder reports on how the field's welcoming environment, multidisciplinarity, and critical mass of women help explain the numbers.

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Press and citations

Journal editors select which of their articles to promote with additional editorial coverage and other means. A new statistical analysis of a sample of papers from *Physical Review Letters* shows that those promotional efforts are correlated with more citations.

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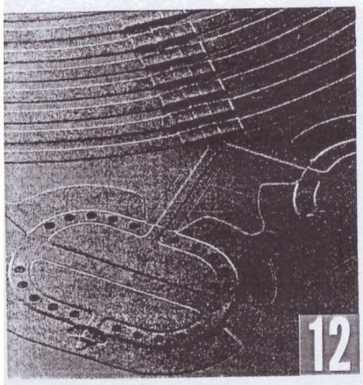

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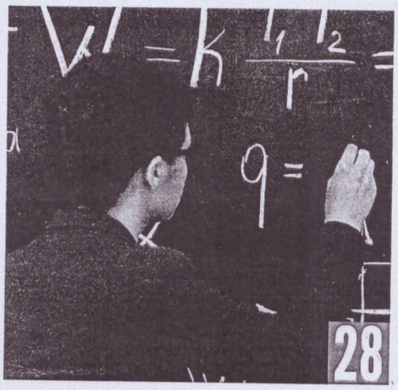

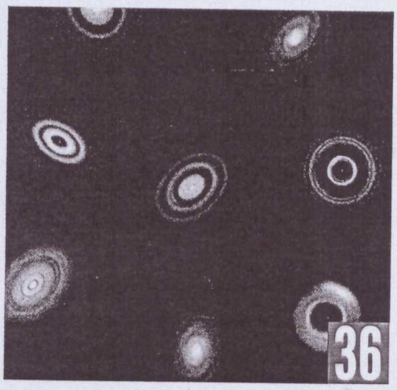

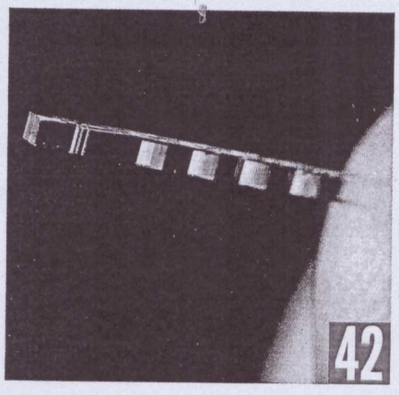

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Research into dual-process theories of reasoning from cognitive psychology suggests ways to improve classroom instruction in physics.

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Sean M. Andrews

Astronomical observations of gas, dust, and rocky material in the disks from which planets emerge help refine theoretical ideas about how they form.

42 Microchip accelerators

R. Joel England, Peter Hommelhoff, and Robert L. Byer

An international collaboration aims to couple ultrafast lasers with integrated photonics to create chip-scale devices.



ON THE COVER: This artist's impression depicts a protoplanetary disk surrounding a star. Material from the disk flows along the star's magnetic field lines to strike the star's surface. The ensuing flares can be observed both directly and as echoes once the light reaches and illuminates the inner disk. Timing the echoes yields the radius of the inner disk. Turn to the article by Sean Andrews on **page 36** to learn how new observations are enriching our understanding of the disks of gas, dust, and ice that nurture planets. (Image courtesy of NASA/JPL-Caltech.)

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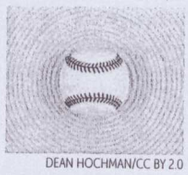

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Physics of baseball

Major League Baseball recently started cracking down on pitchers' alleged use of tacky materials to give the ball extra spin. But how much of an advantage does an enhanced grip confer? PHYSICS TODAY's Andrew Grant investigates what we know about the relationship between pitch mechanics and ball trajectory.

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LAUREN HUGHES/NASA

Deaf scientists

Hard of hearing and deaf people are still underrepresented in STEM fields, but the availability of technology and interpreters has lowered traditional barriers. Deaf scientists at NASA and CERN discuss their experiences getting access to necessary services and the needs of the deaf community in STEM.

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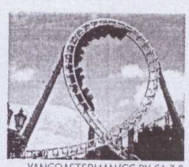

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Loop-the-loop

Despite its status as a classic demonstration of energy conservation, balls that travel around a loop-the-loop track lose energy. That loss is usually dismissed as arising from nonconservative forces. PHYSICS TODAY's Madison Brewer reports on a recent study of the motion's complicated physics.

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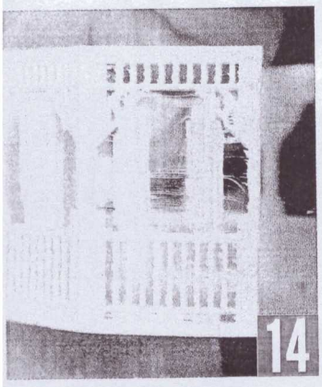



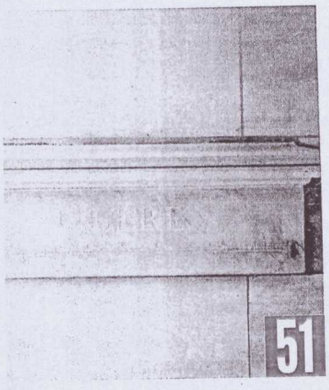

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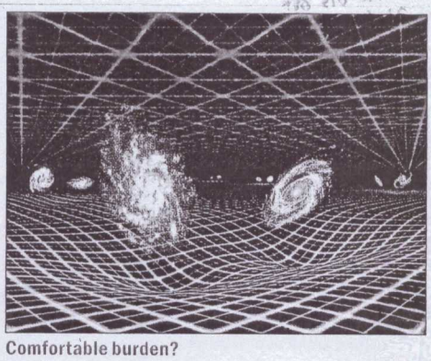

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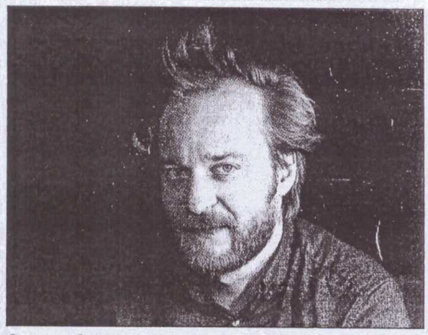

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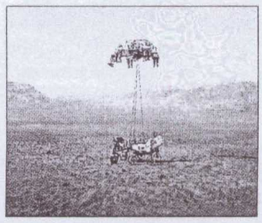

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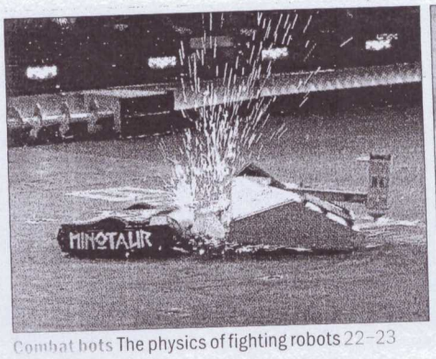

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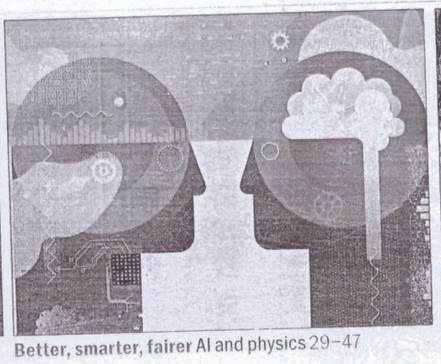

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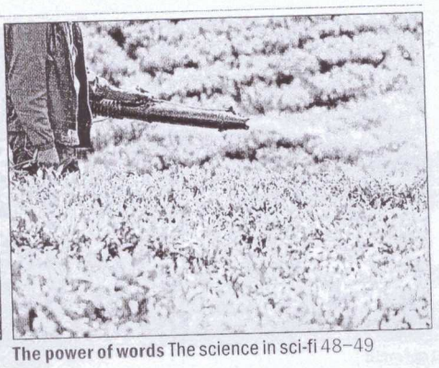

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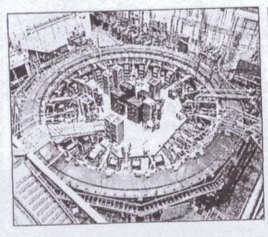

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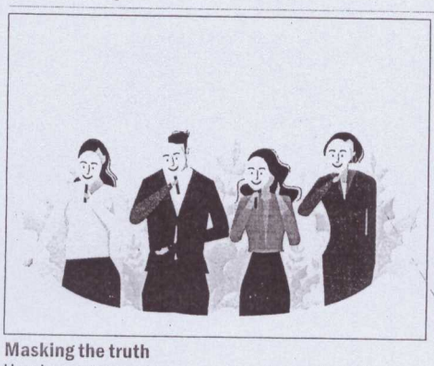

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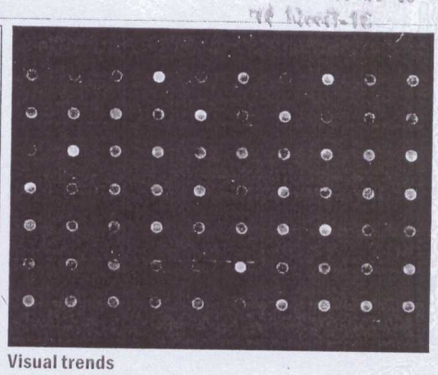

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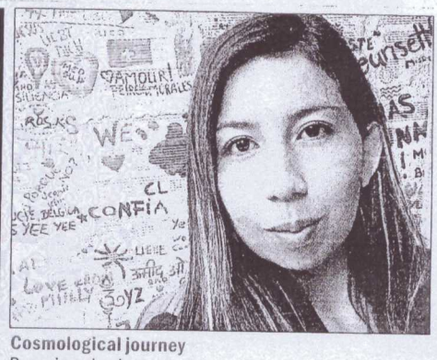

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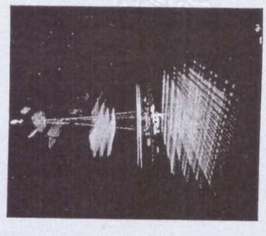

Multimedia

Listen to the *Physics World Stories* podcast for more on the latest muon g--2 experiments (bit.ly/3fmaAyd).

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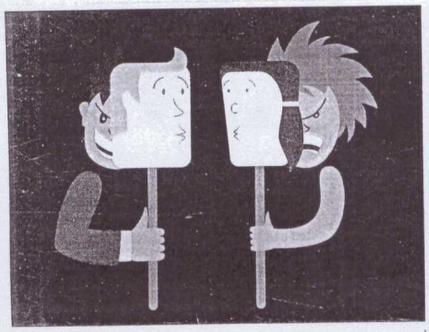

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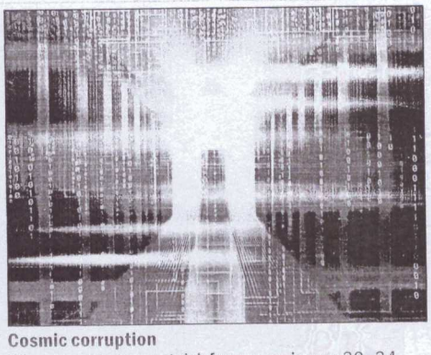

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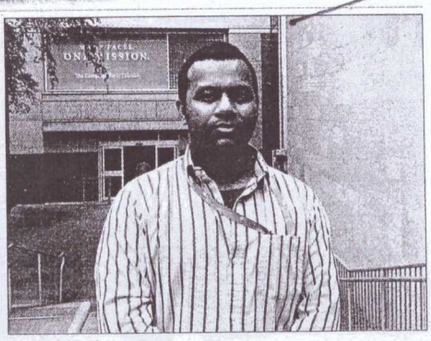

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Christopher Wahl

Multimedia

The latest *Physics World Stories* podcast (bit.ly/2S7Vzs2) features an interview with Carlo Rovelli, whose new book on quantum physics is reviewed on p40

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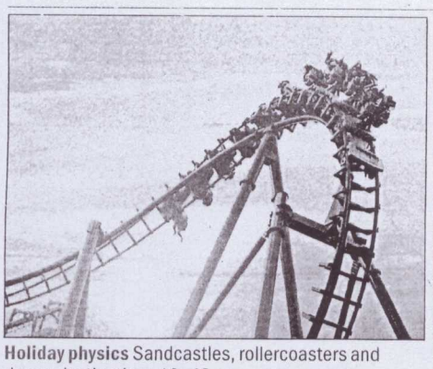

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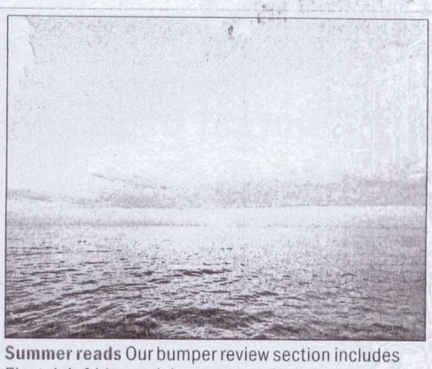

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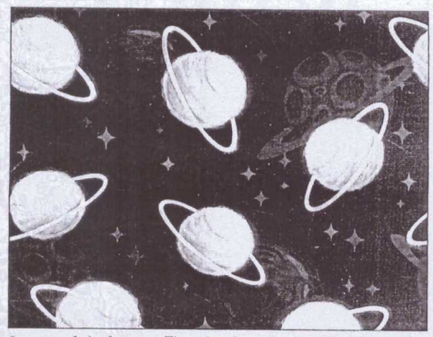

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Listen to the *Physics World Weekly* podcast of 15 July where you can hear from Charles Seife, the author of the controversial new biography of Stephen Hawking

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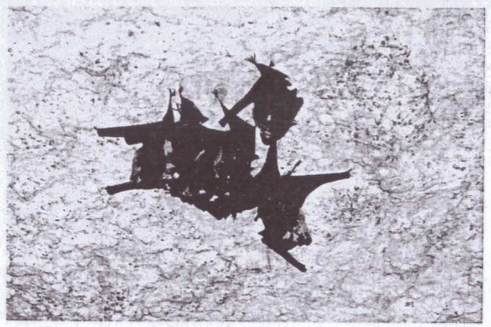



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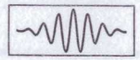

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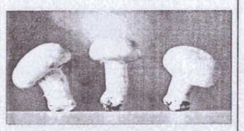

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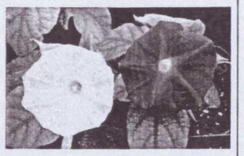

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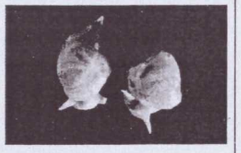

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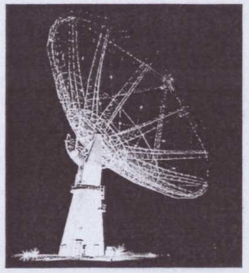

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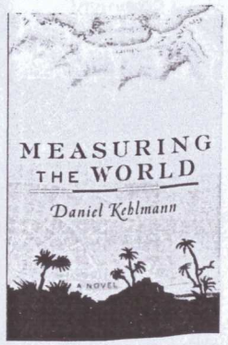

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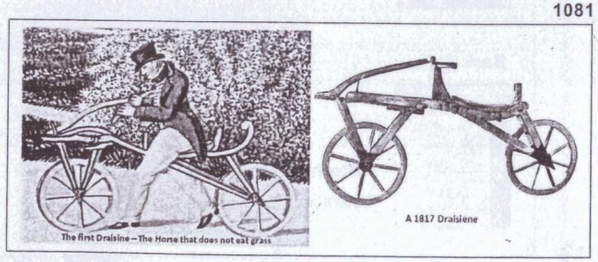

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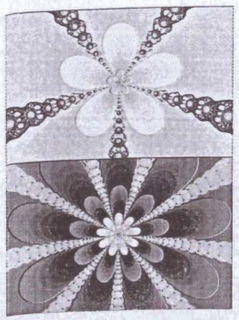

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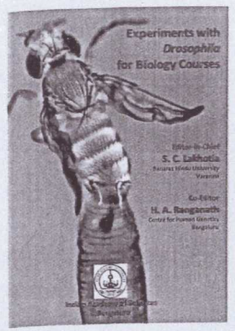

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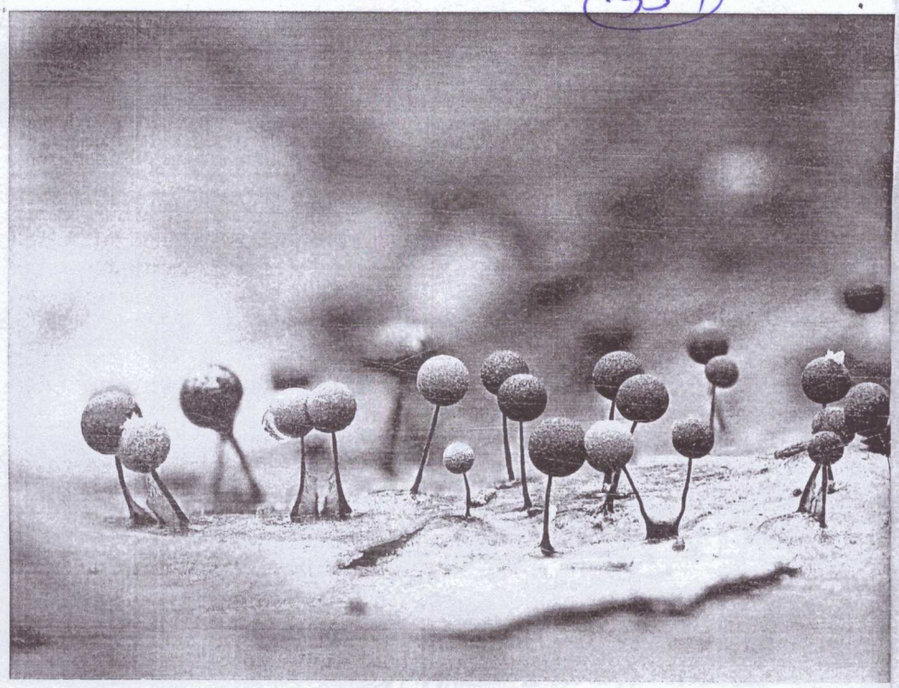

Cover image: Slime mould (*Lamproderma scintillans*) sporangia growing on a rotting oak leaf
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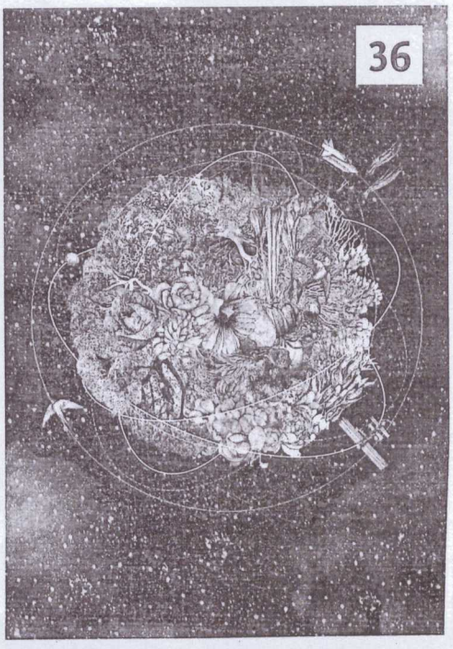

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SAGE

घोंघे की खोल में घुमाव कैसे आता है?

सममिति यानी सिमेट्री कई पौधों, जन्तुओं और यहाँ तक कि पानी जैसे कुछ अणुओं का भी गुण होता है। लेकिन घोंघे और उसकी कुण्डलित खोल में यह बात नहीं है। ये कुछ इस तरह असममित होते हैं कि इनके दर्पण प्रतिबिम्ब को इनके ऊपर जमाया नहीं जा सकता क्योंकि असममिति की शुरुआत एक कोशिका अवस्था में ही हो जाती है। अध्ययन के मुताबिक इस बुनियादी कुण्डली के पीछे इकलौते जीन का हाथ है। एक जीन है जो एक प्रोटीन बनवाता है और यह प्रोटीन इस बात को तय करता है कि कोशिकाएँ अपनी संरचनाएँ कैसे विकसित करती हैं और अन्ततः पूरे घोंघे की अन्दर और बाहर की आकृति को प्रभावित करता है। आइए, इस महत्वपूर्ण लेख में पढ़ते हैं कि कैसे घोंघे के घुमाव की दिशा तय होती है।

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शिक्षा वास्तव में एक दूसरी दुनिया को मुमकिन बनाने का शुरुआती बिन्दु है और शिक्षण खुद को शिक्षित करने का बढ़िया तरीका है। उक्त लेख के माध्यम से समझते हैं कि कैसे एक अच्छा गणित शिक्षक, लेखक की शिक्षण शैली में परिवर्तन ला पाया और गणित की समझ को विद्यार्थियों तक पहुँचाने में सहायक बना। पढ़ते हैं इस सीरीज़ के छठवें लेख को।

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For all practical procedures described in *SSR*, we have attempted to ensure that:
- the requirements of UK health & safety law are observed;
- 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 and technicians should always check their employer's risk 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:
Safeguards in the School Laboratory, 12th edn, ASE, 2020.
Be Safe! Health and Safety in School Science and Technology for Teachers of 3- to 12-year-olds, 4th edn, ASE, 2011.
Topics in Safety, ASE, latest version on the ASE website: www.ase.org.uk/resources/topics-in-safety (login required).
Hazcards, CLEAPSS, latest version, and other relevant publications, on the CLEAPSS website: www.cleapss.org.uk (almost all schools, colleges and teacher training establishments in the UK outside Scotland are members, as are many overseas).
Hazardous chemicals database, SSERC, latest version on the SSERC website: www.sserc.org.uk/health-safety/chemistry-health-safety/hazchem_database-2/ (schools, colleges and teacher training establishments in Scotland).
Preparing Risk Assessments for Chemistry Project Work in Schools & Colleges, SSERC, 2020.

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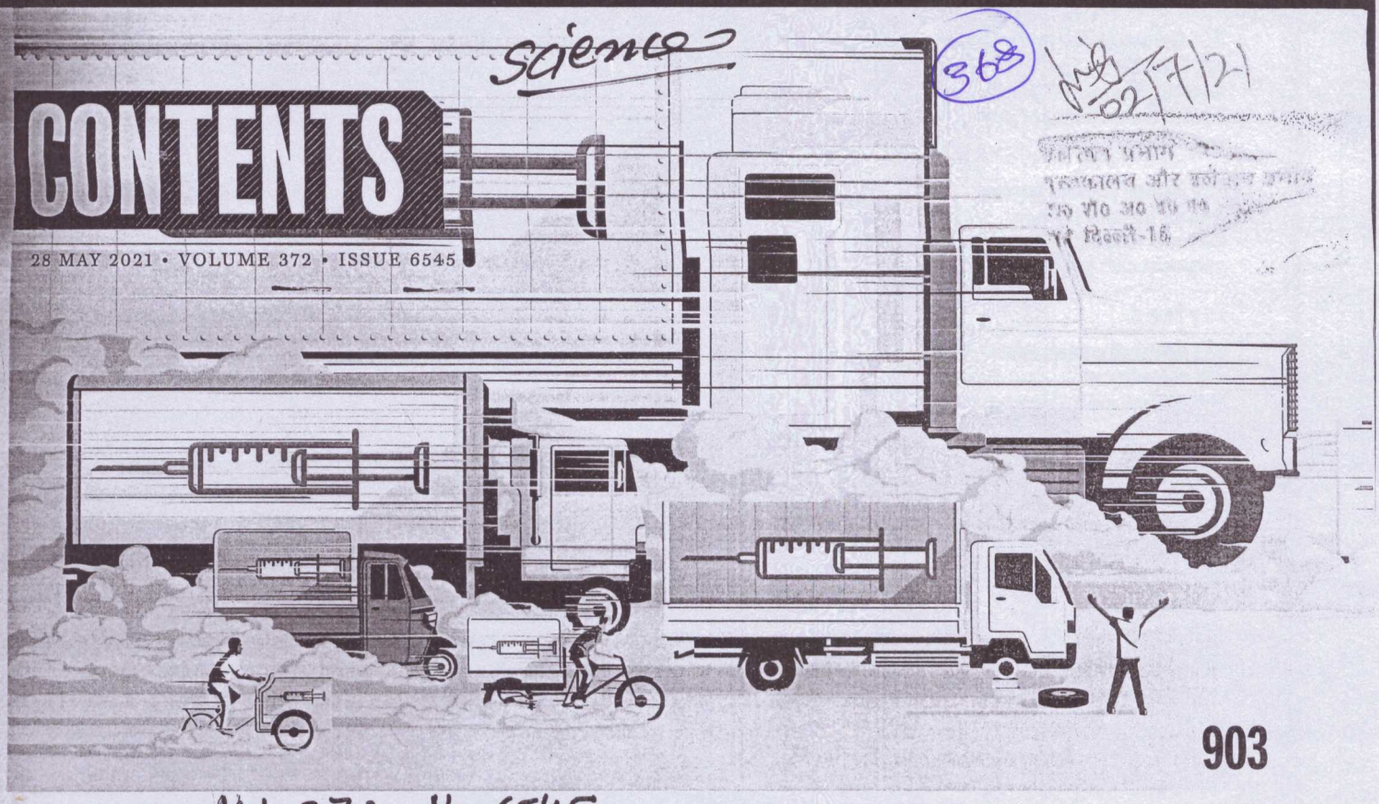

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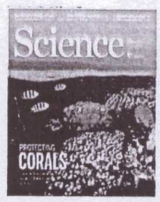
Climate change threatens coral reefs by causing heat stress events, leading to widespread coral bleaching and mortality. Yet some coral reefs, such as this one in the Red Sea, are more resilient. A global analysis of 223 sites found that local stressors act synergistically with climate change to kill corals, but effective local management, alongside global efforts to mitigate climate change, can help reefs survive. See pages 908 and 977.
Photo: Tom Shlesinger



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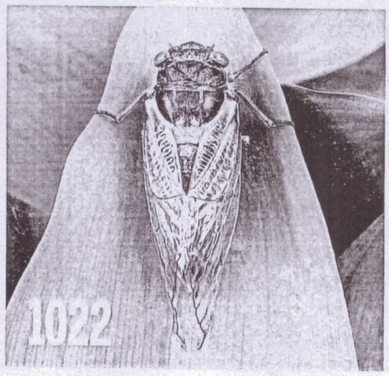

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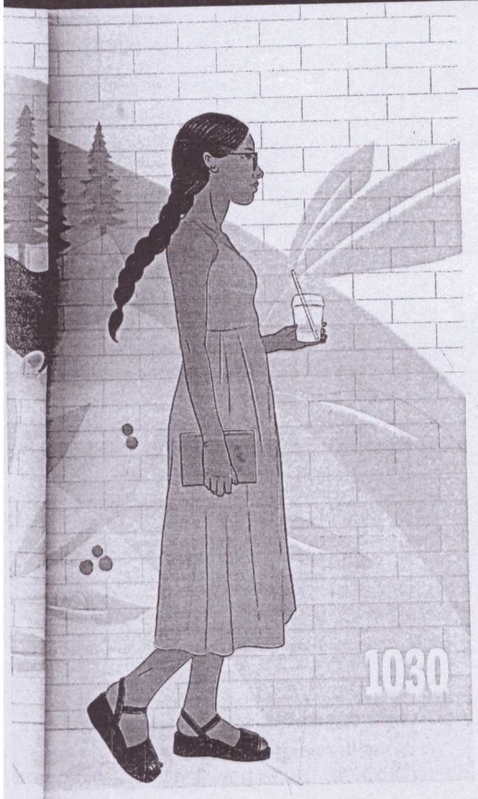

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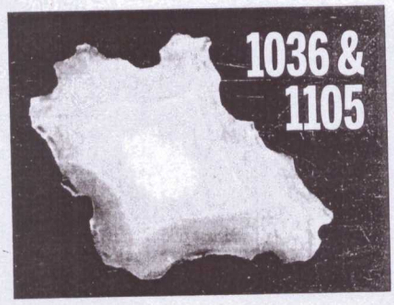

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The human transcription preinitiation complex (PIC; pink and red) and multisubunit Mediator complex (orange, left) are assembled into a supercomplex (76 polypeptides, molecular mass: 4.1 megadaltons) on a promoter region of DNA (orange coil, center) to initiate gene transcription. Mediator binds RNA polymerase II (purple) in the PIC and stimulates phosphorylation of its C-terminal domain (highlighted in white), a critical event in transcription initiation. See page 1055. *Illustration: V. Altounian/*Science; *Data: Y. Xu/Fudan University*



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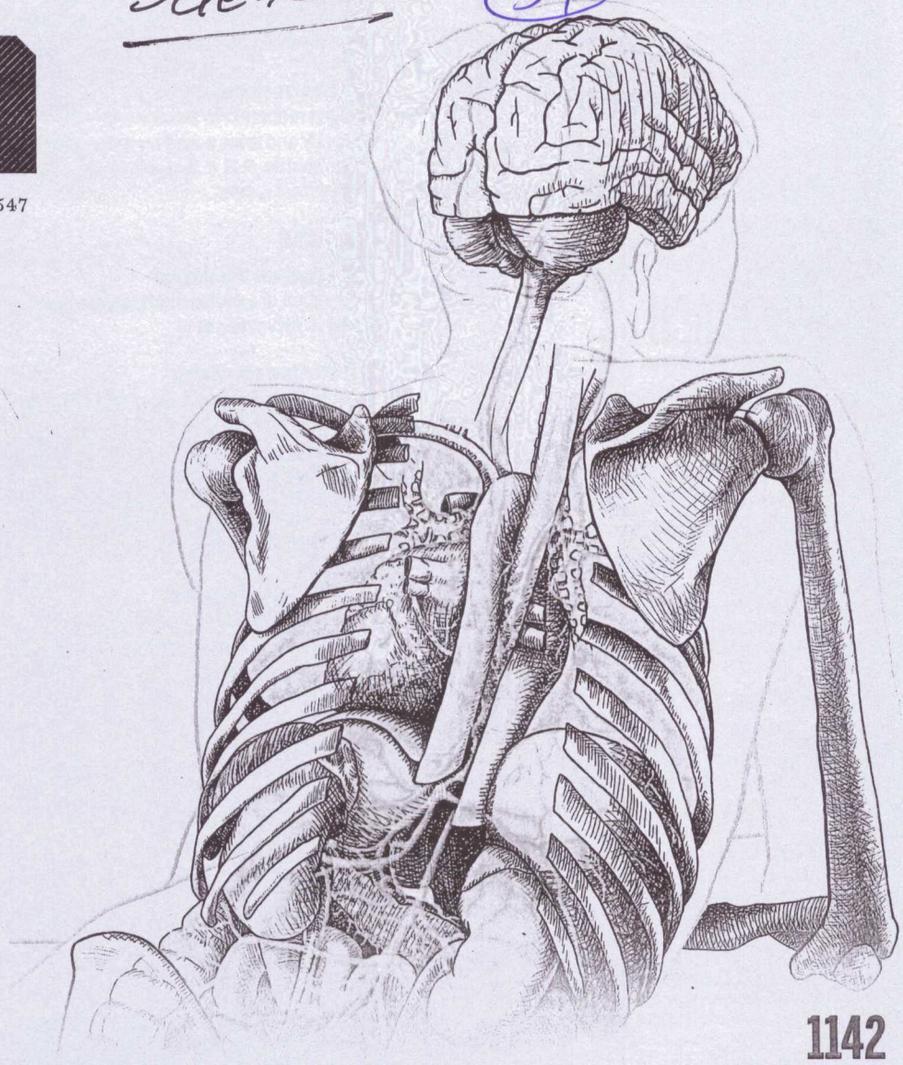

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Cryo–electron tomograph inside a yeast cell (blue, ribosomes; yellow, genetically encoded nanoparticle; gray, organelle membranes). This technique is used to resolve macromolecular structure and spatial organization in the native cellular environment with single-molecule precision and to study phase separation. The Gordon Research Conference on Three Dimensional Electron Microscopy will be held from 31 October to 5 November 2021 in Newry, Maine. See page 1230 for the Gordon Research Conference schedule and preliminary programs. *Image: Dimitry Tegunov, Stefan Pfeffer, Jürgen Plitzko, Liam Holt, Benjamin D. Engel*



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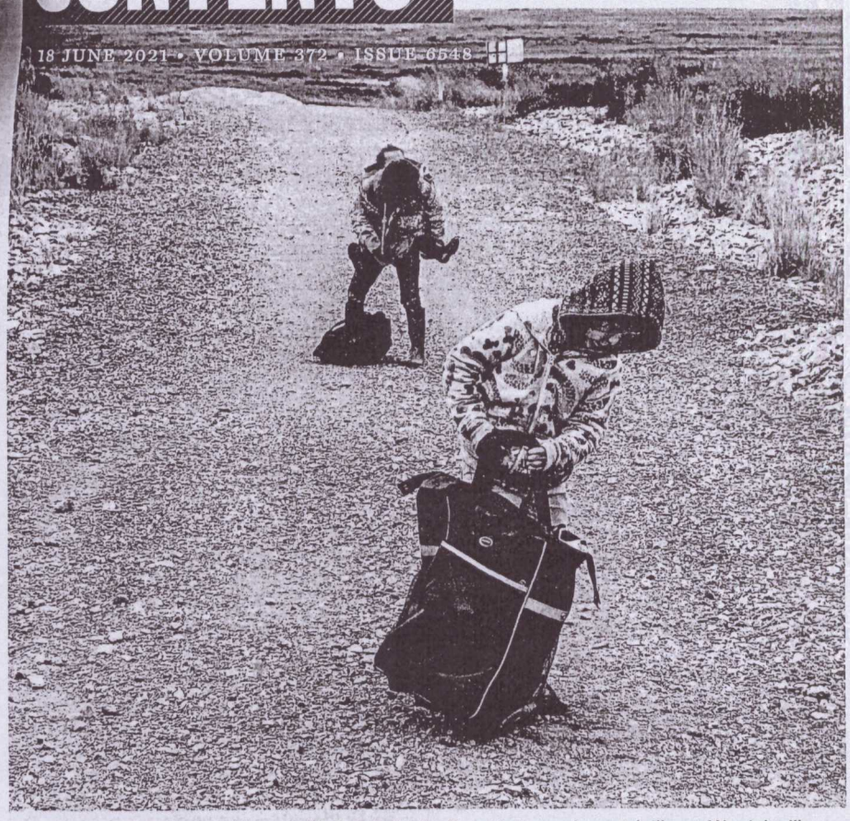

Children walk to their new home in Mertarvik, Alaska. Soon, their grandparents' village of Newtok will no longer be suitable for living, owing to permafrost melt and erosion.

PHOTO: VLAD SOKHIN/PANOS PICTURES/REDUX

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An abandoned mosque sits outside a sea wall in Pluit, Jakarta, Indonesia. Confronted with both sea level rise and subsidence due to groundwater extraction in this city of more than 10 million people, the government has announced plans to relocate the national capital to the island of Borneo. Research has much to offer communities around the globe that are facing displacement from climate change—but community members must be involved, their voices heard. See page 1274. *Photo: © Kadir van Lohuizen/NOOR*



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Digitally reconstructed skull of a hominin from 130,000 years ago. This previously unrecognized *Homo* group, identified at Nesher Ramla, Israel, sheds light on Neanderthal origins and the evolutionary history of the *Homo* lineage. Late members of this group inhabited the Levant contemporaneously with *Homo sapiens* and interacted with them. See pages 1395, 1424, and 1429. *Illustration: Ariel Pokhojaev, Rachel Sarig, Hila May, Israel Hershkovitz*



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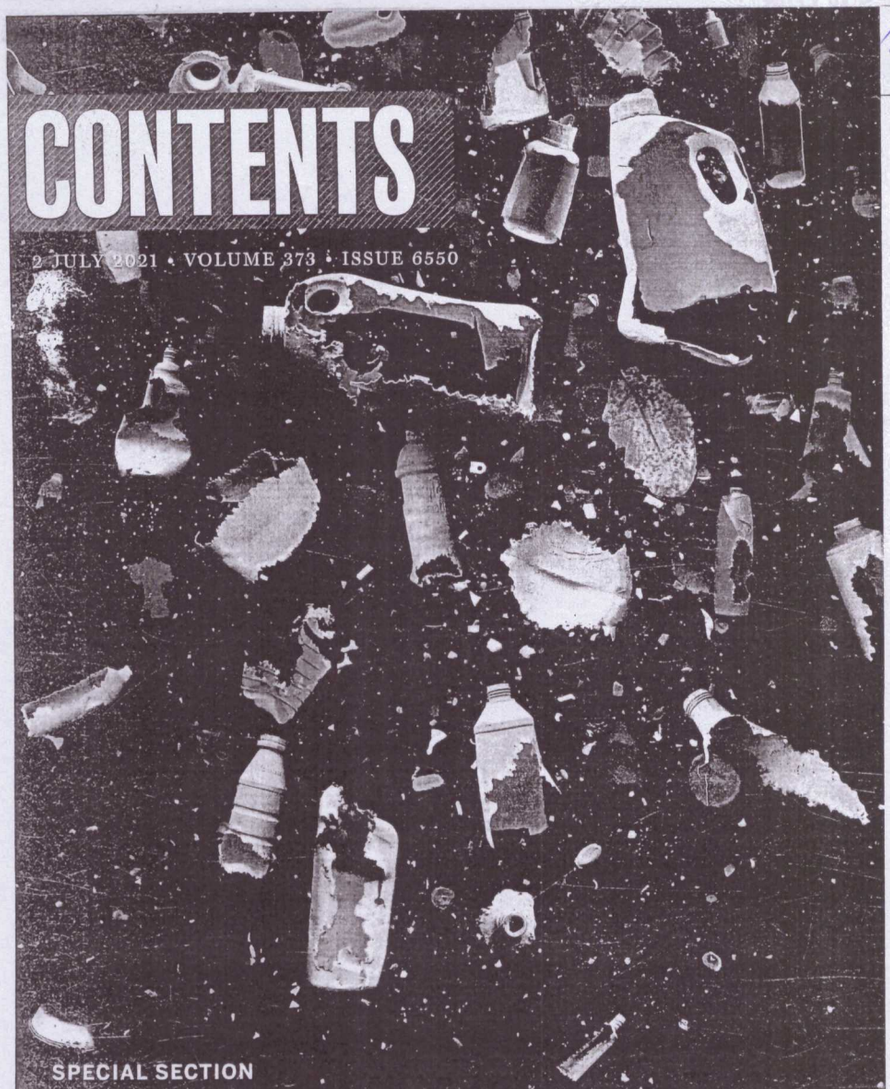

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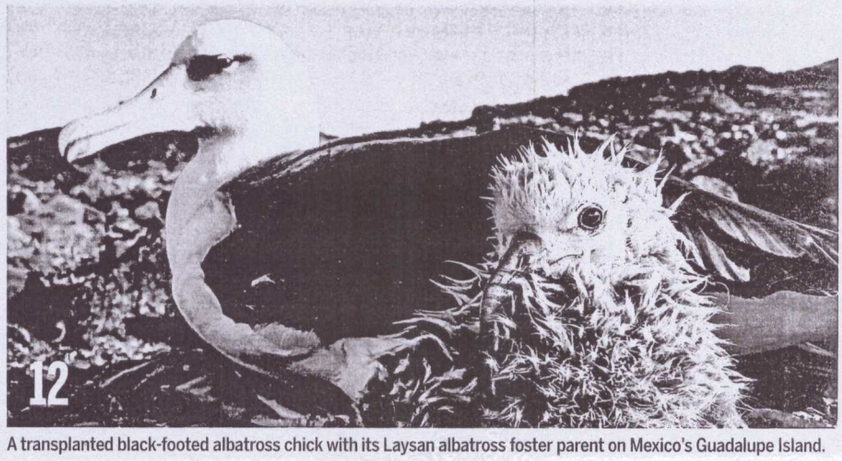

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A transplanted black-footed albatross chick with its Laysan albatross foster parent on Mexico's Guadalupe Island.

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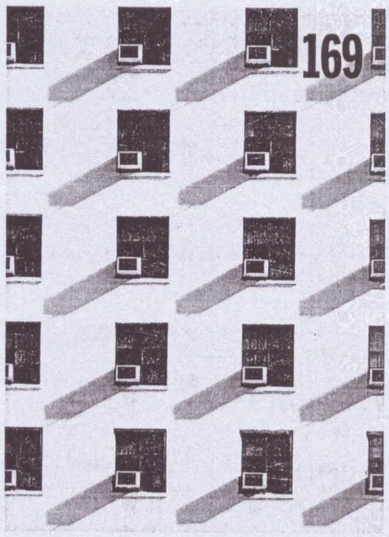

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Photo: Laura Chase de Formigny Photography



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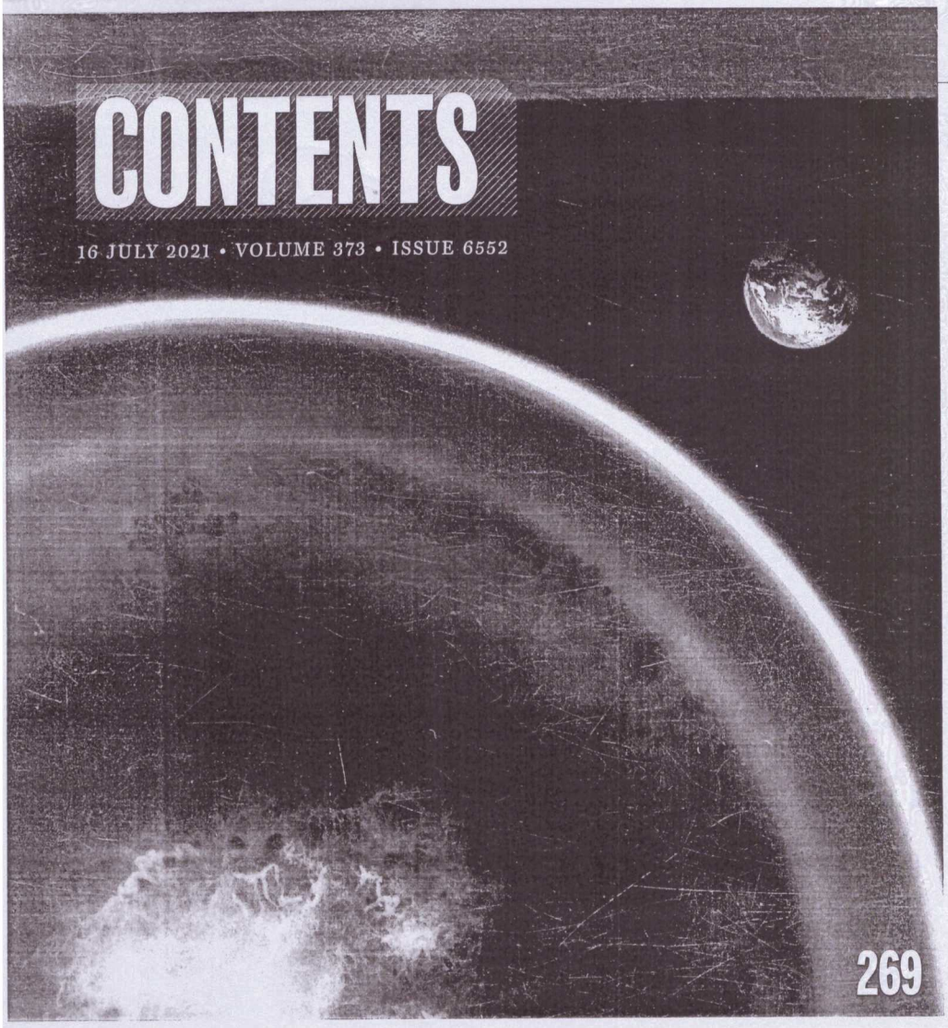

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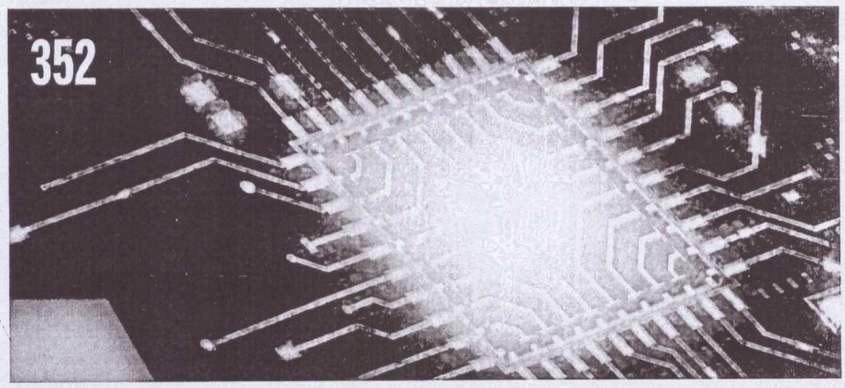

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A 7-week-old spotted hyena cub explores the area around its den in Masai Mara National Reserve, Kenya, while its mother looks on. The cub, still in its natal coat of fur, has already started to learn which clanmates its mother associates with most closely. This months-long learning process is most likely the mechanism by which young hyenas "inherit" their mothers' social networks. See pages 274 and 348. *Photo: Lily Johnson-Ulrich*



IMAGE: GREG STEWART/SLAC NATIONAL ACCELERATOR LABORATORY

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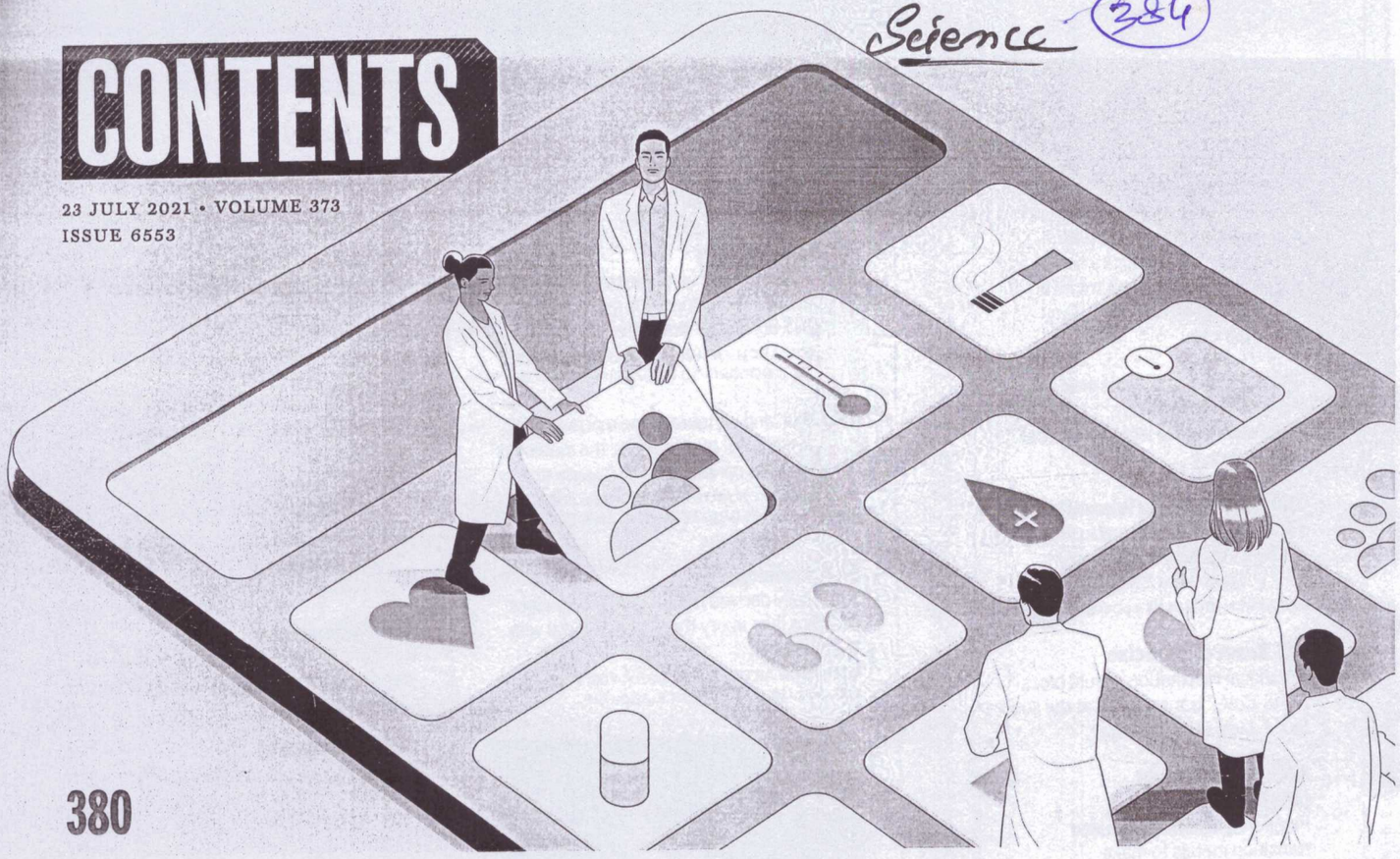

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Vital clues to a planet's geologic history are contained in its interior. For 2 years on Mars, the InSight lander has recorded seismic data to constrain the planet's interior structure. The data reveal a layered crust, a mantle with a thick lithosphere, and a liquid iron-nickel core enriched in light elements, suggesting that Mars formed and evolved differently from Earth. See pages 388, 434, 438, and 443. *Illustration: C. Bickel/Science; Data: InSight Mars SEIS Data Service (2019)*



PHOTO: BARBARA KLUMP/MAX PLANCK INSTITUTE OF ANIMAL BEHAVIOR

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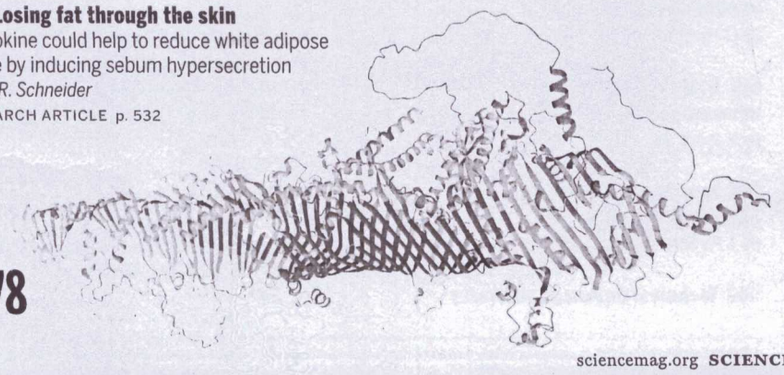

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IMAGE: (TOP) JASON SOLO/THE JACKY WINTER GROUP; (BOTTOM) DEEPMIND

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A hundred years after the discovery of insulin, type 1 diabetes remains a chronic disease that requires lifelong daily management. This includes monitoring food intake, measuring blood glucose via finger pricks, and administering insulin shots through needles or, more recently, insulin pumps and continuous-loop devices. Improving treatment with cell therapies and delaying symptom onset with prevention strategies should enhance the future management of the disease. See page 504. *Illustration: Jason Solo/The Jacky Winter Group*

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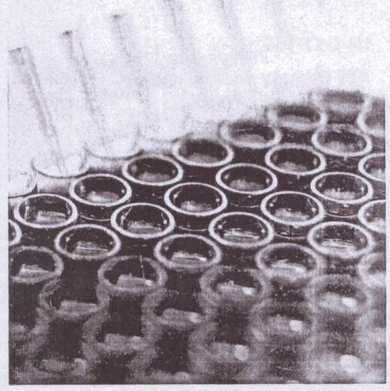

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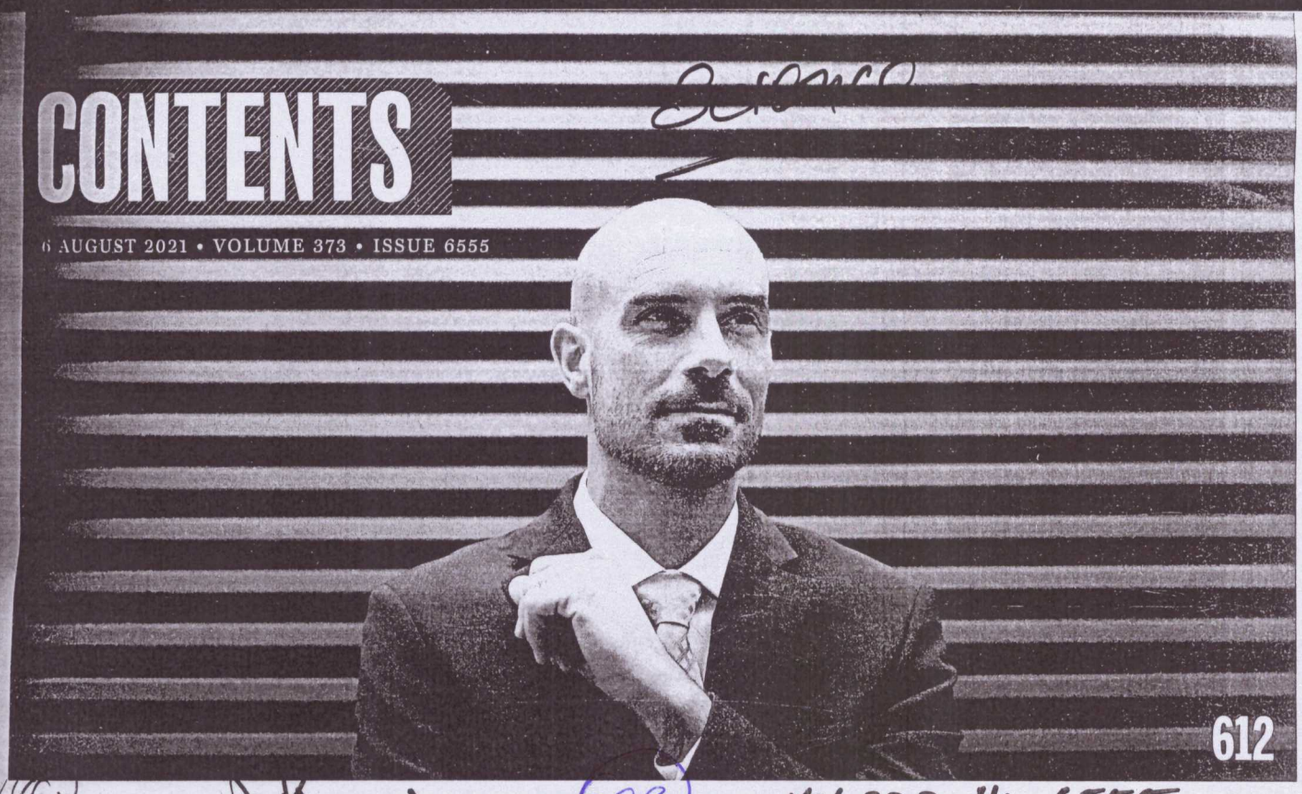

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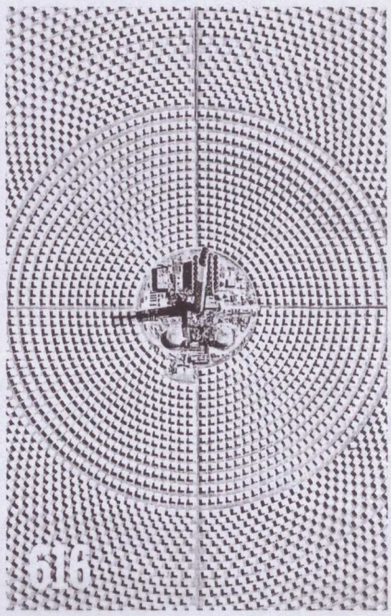

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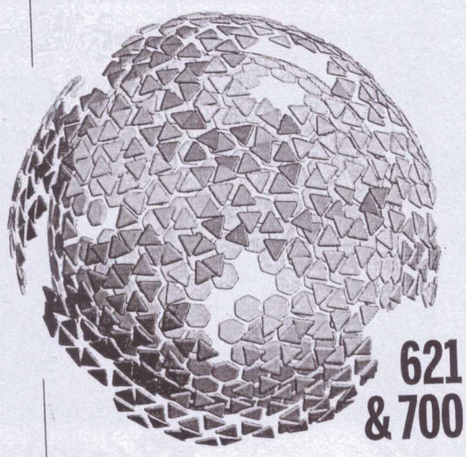

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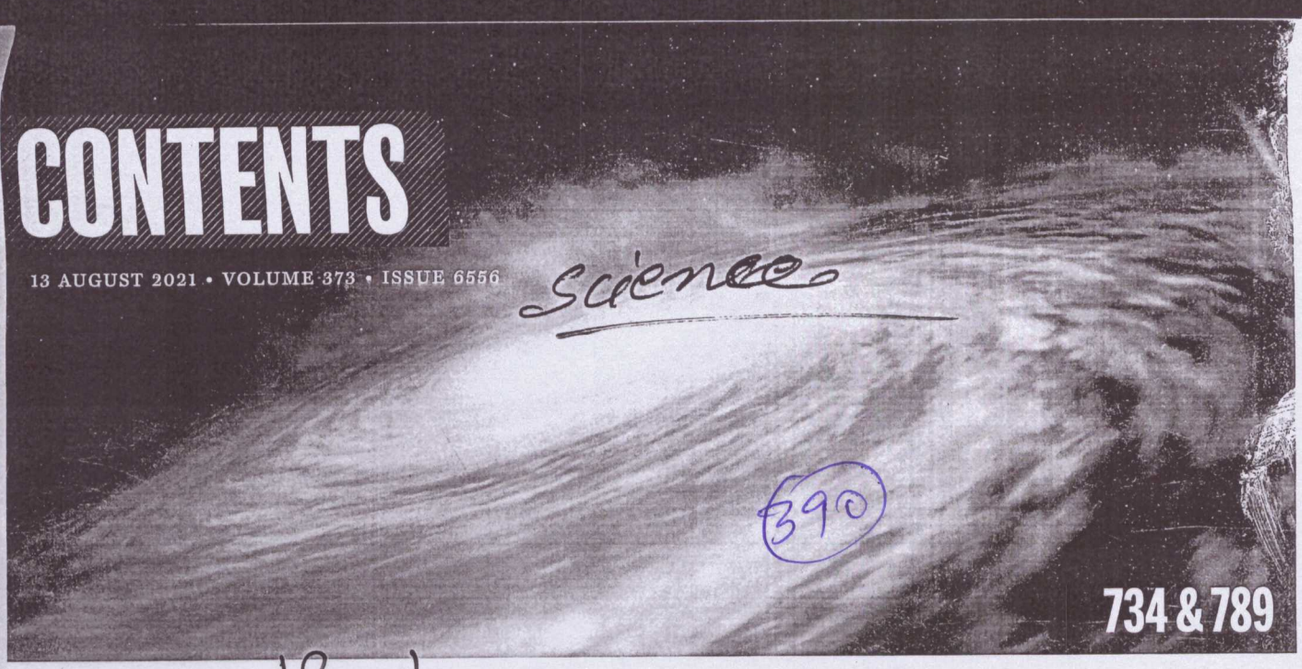

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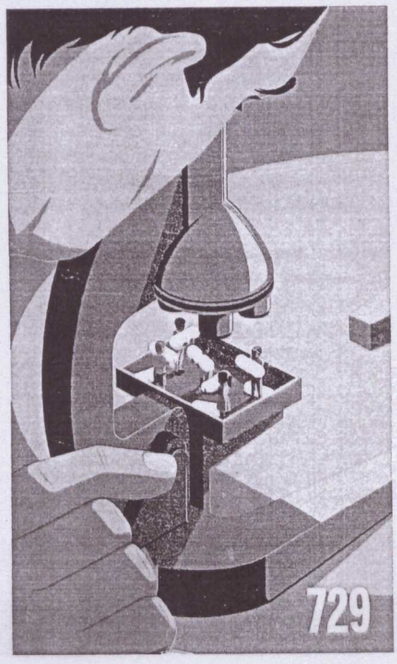

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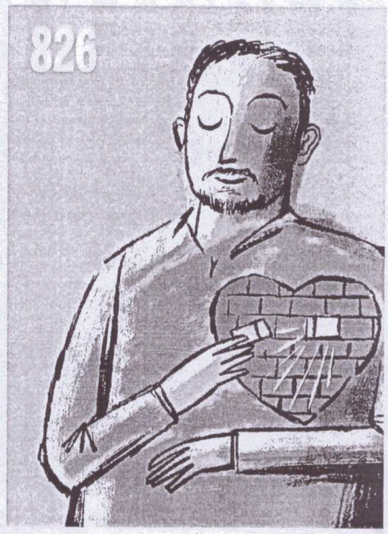

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Reproduction of a life-size oil painting of an adult male woolly mammoth navigating a mountain pass in Arctic Alaska. Little is known about the movement patterns of these extinct giants. Isotopic records from a 17,100-year-old mammoth tusk reveal that the animal covered an extensive geographic range during its lifetime. However, as the ice age ended and the Arctic environment began to change, maintaining this level of mobility would have been increasingly difficult. See page 806.
Illustration: James Havens/ The Havens Studio, Alaska



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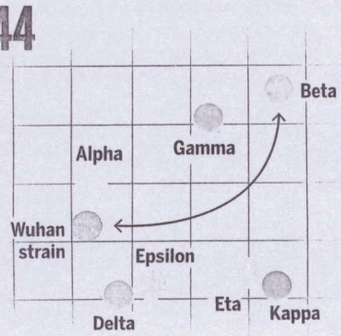

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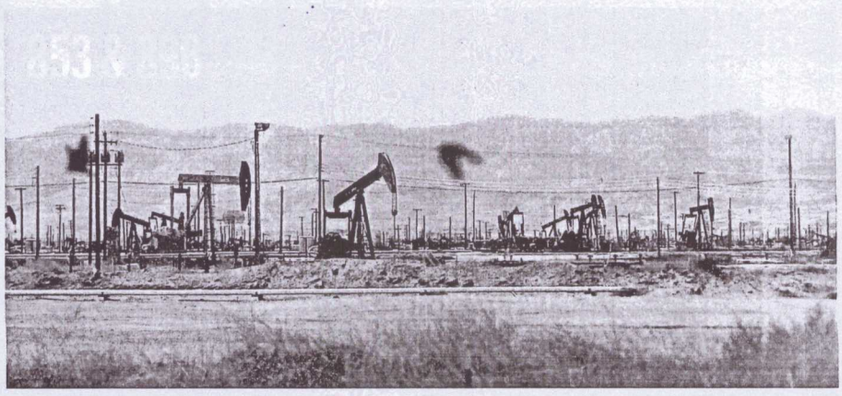

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New deep learning software can predict protein structures in minutes by simultaneously considering one-, two-, and three-dimensional information (sequence, distance, and coordinates, respectively), allowing the network to collectively reason about the relationship between a protein's amino acid sequence and its folded structure. The software can also be used to build models of complex biological assemblies from the sequences of interacting partners in a fraction of the time previously required. See page 871. *Illustration: V. Altounian/* Science; *Data: Minkyung Baek/University of Washington*



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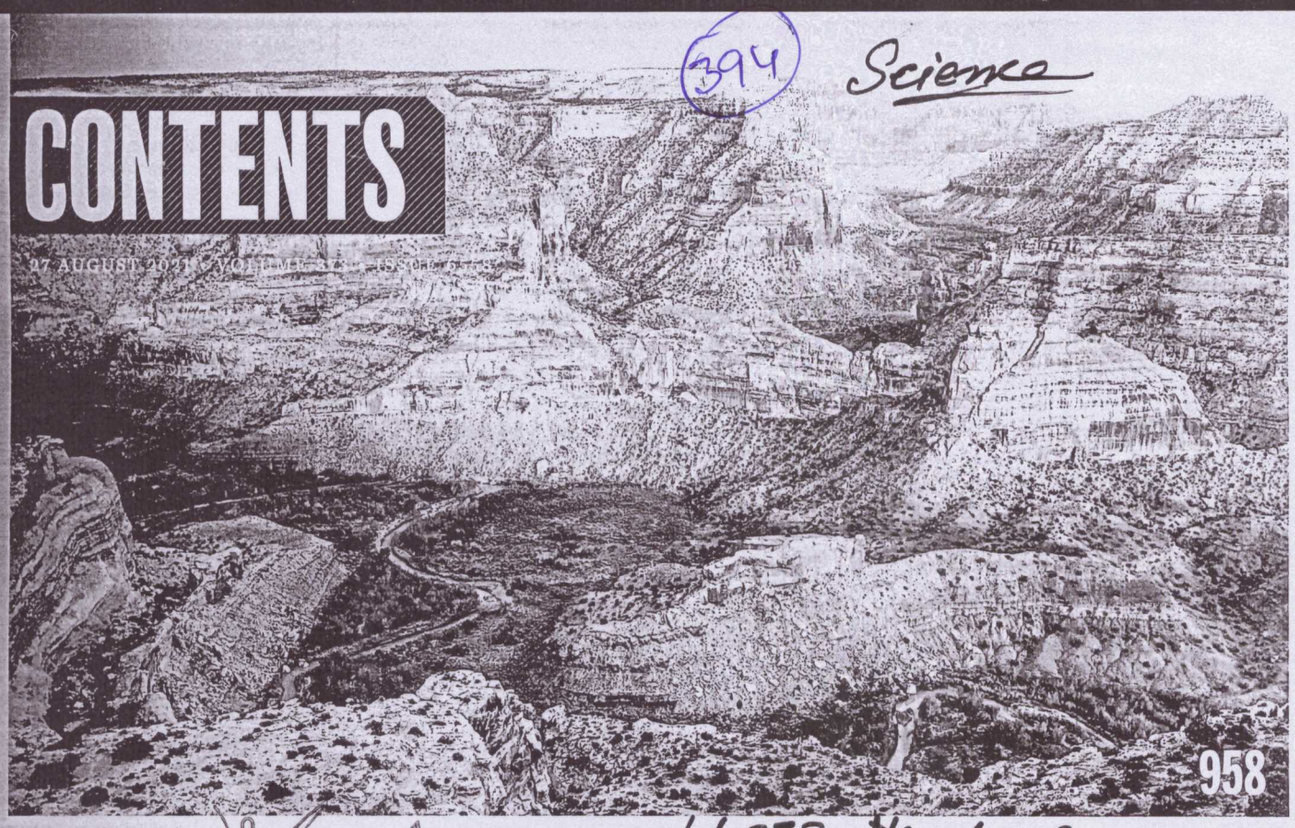

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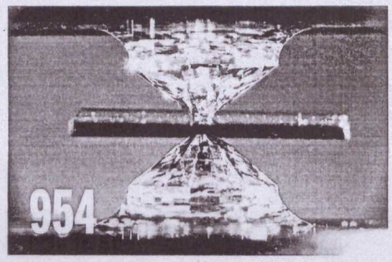

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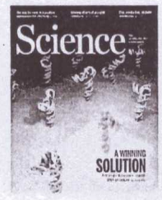
ON THE COVER

An artificial intelligence algorithm selects an RNA molecule's three-dimensional shape out of a sea of incorrect shapes. Computational prediction of the structures into which RNAs fold is particularly important—and particularly difficult—because so few structures are known. The success of machine learning despite this lack of data opens doors to understanding and designing diverse molecules, including medicines. See pages 964 and 1047. *Illustration: C. Bickel/ Science; Data: Andrew M. Watkins and RNA-Puzzles consortium/rnapuzzles.o*





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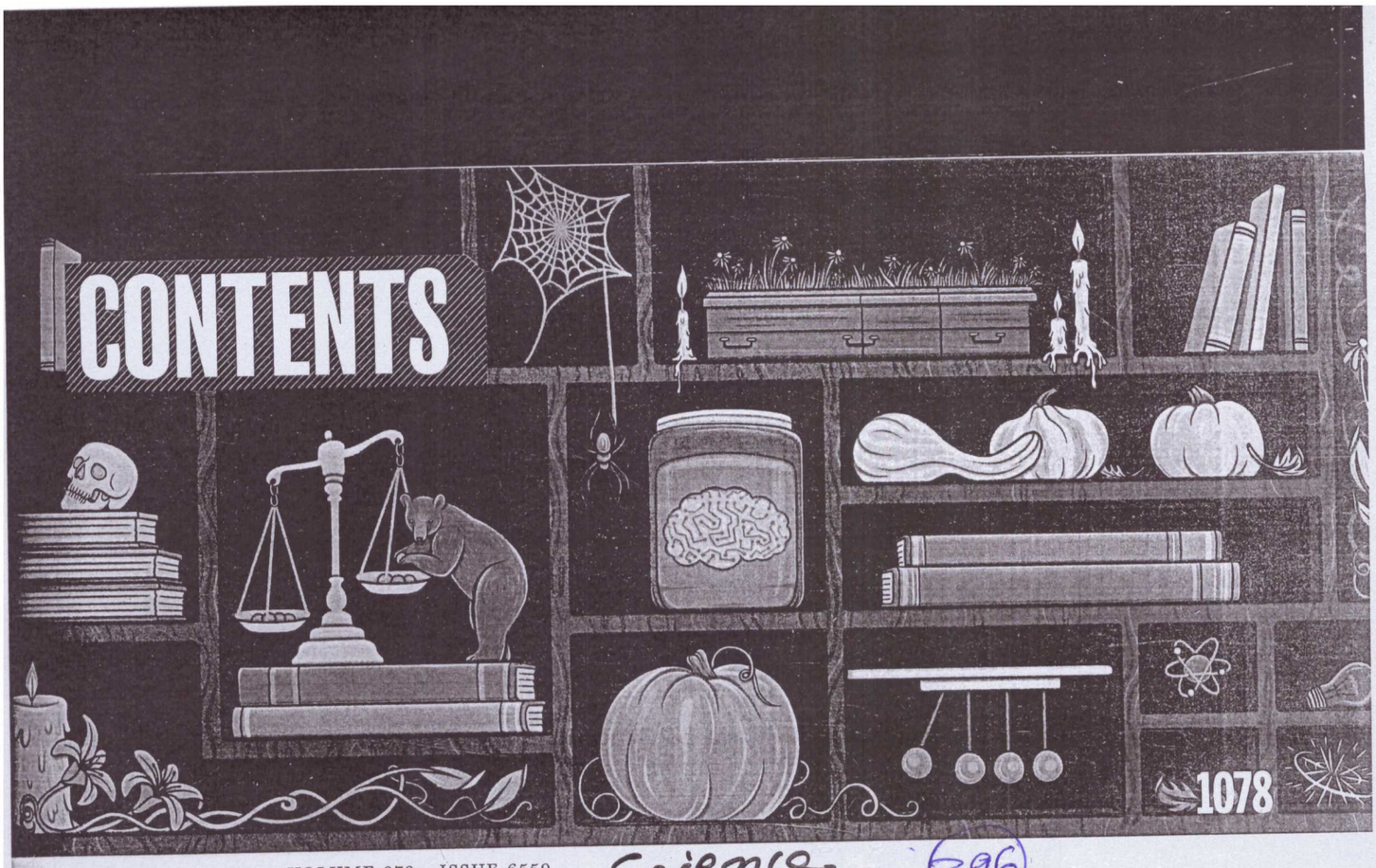

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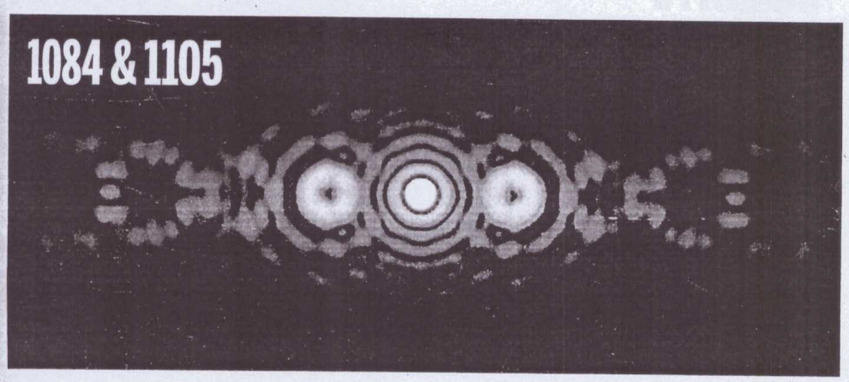

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ON THE COVER

Snow blankets the ground in Dallas, Texas, on 18 February 2021. The cold wave of February 2021 was one of the costliest weather disasters in the United States, especially for Texas, owing to the intersection of energy regulation decisions and exceptionally severe winter weather. New research combines machine learning analysis of observations with numerical modeling to demonstrate that Arctic climate change has modified polar vortex behavior to increase the likelihood of such extreme events. See pages 1091 and 1116. *Photo: Nitashia Johnson/The New York Times/Redux*



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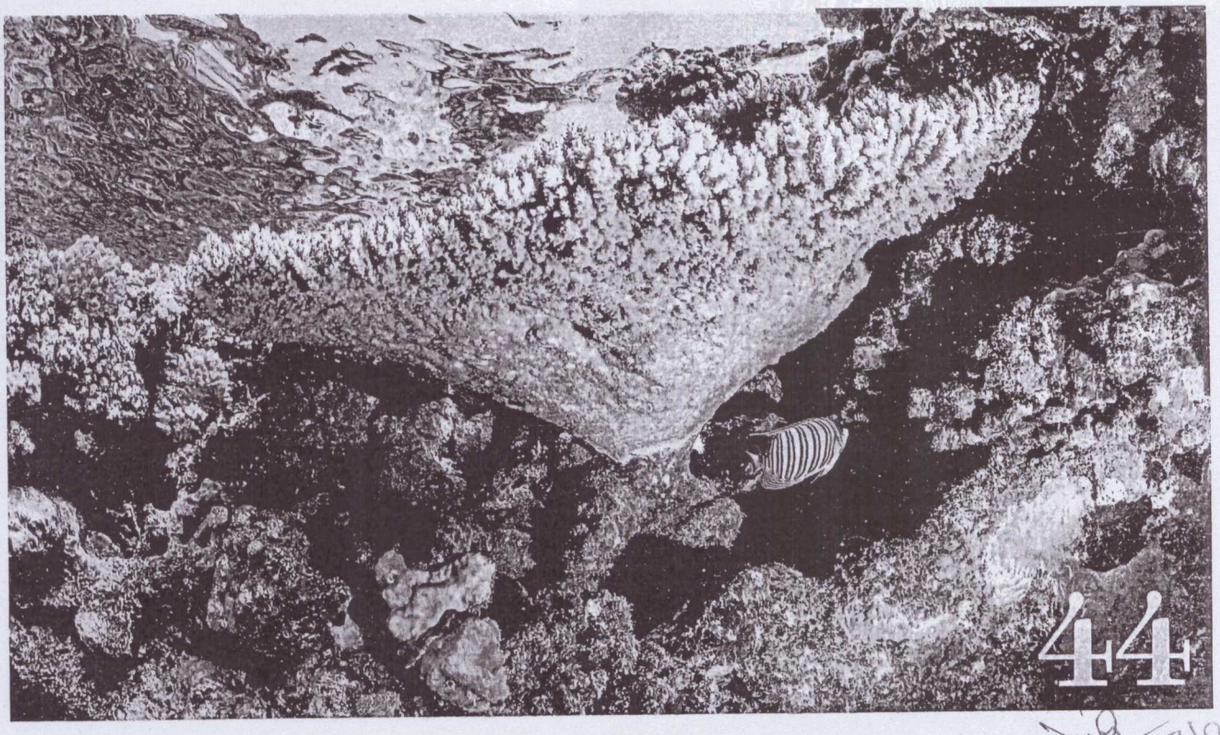

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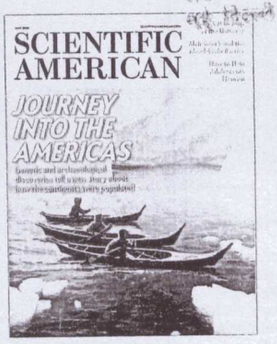

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The peopling of the Americas was once thought to be a simple process: a group of hunters migrated from East Asia in pursuit of game animals around 13,000 years ago and gave rise to the Indigenous peoples who live on these continents today. Recent genetic and archaeological finds have upended this tidy story. **Illustration by Winona Nelson.**

MICHAEL BERUMEN AND MORGAN BENNETT-SMITH

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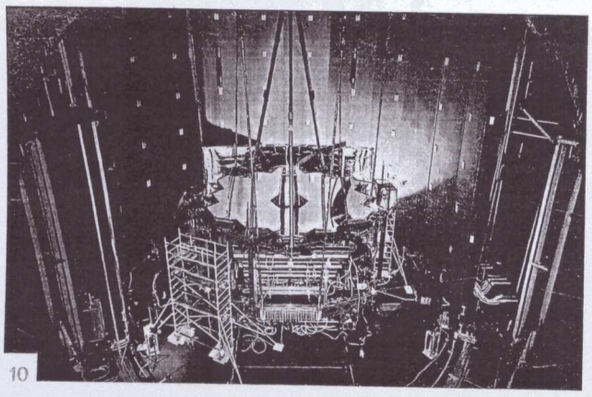

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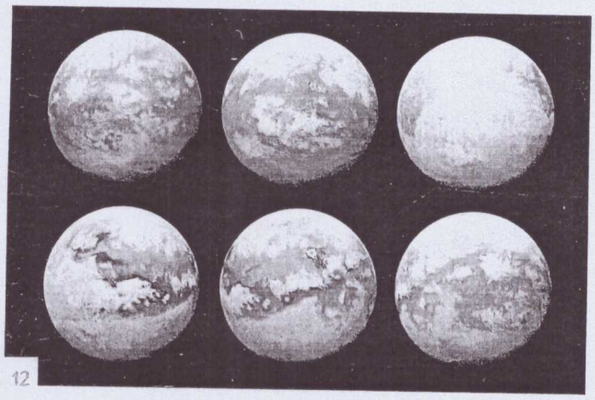

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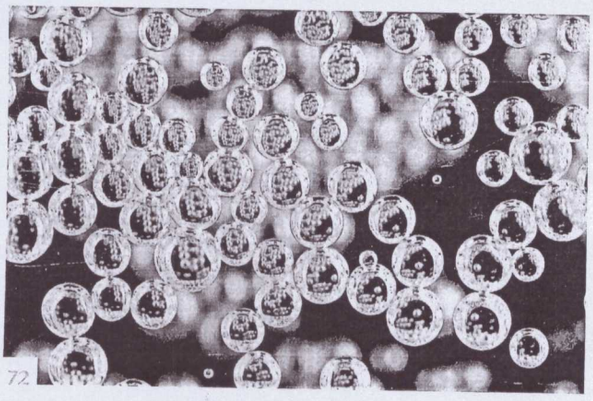

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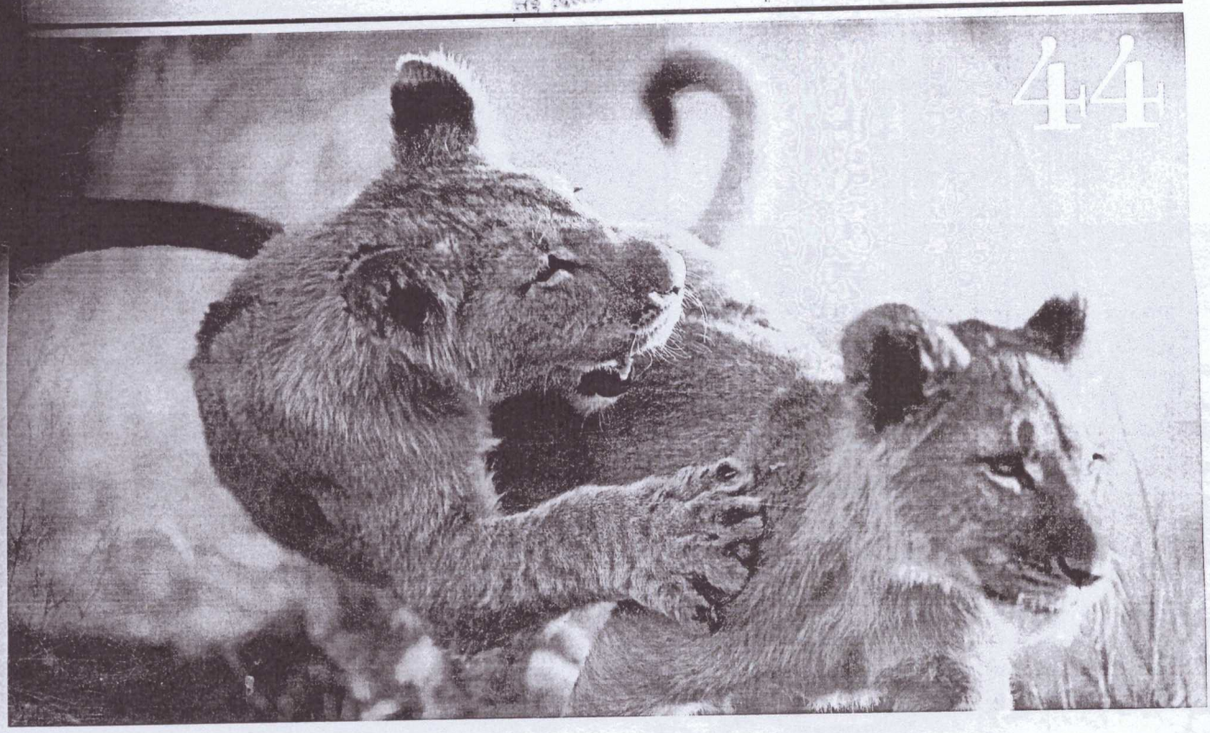

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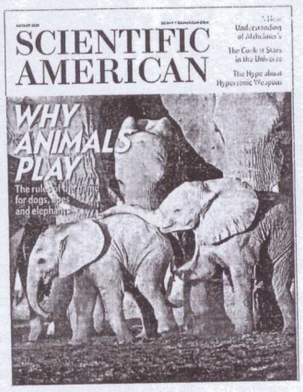

ON THE COVER

Animal play is not just a leisurely pursuit. Though fun for the participants, it is also a means of allowing youngsters to practice skills they will need to succeed later in life—such as evading predators, forging alliances and competing for mates—in a safe environment. **Photograph by Todd Gustafson.**

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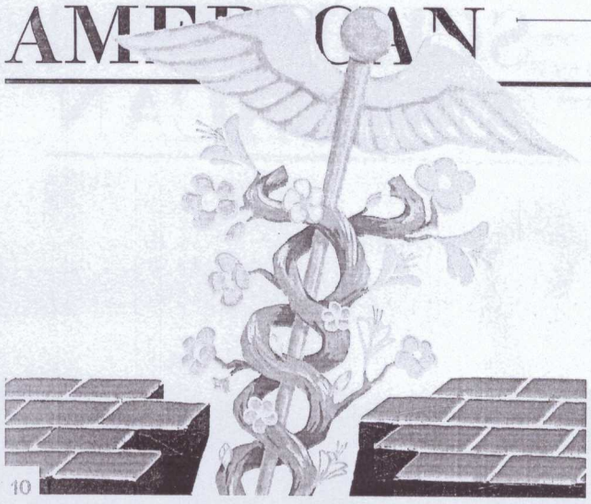
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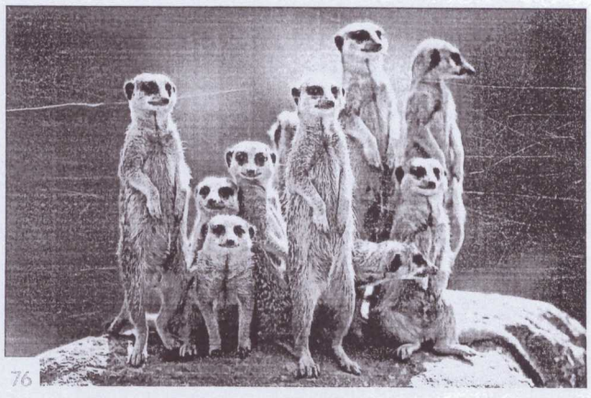
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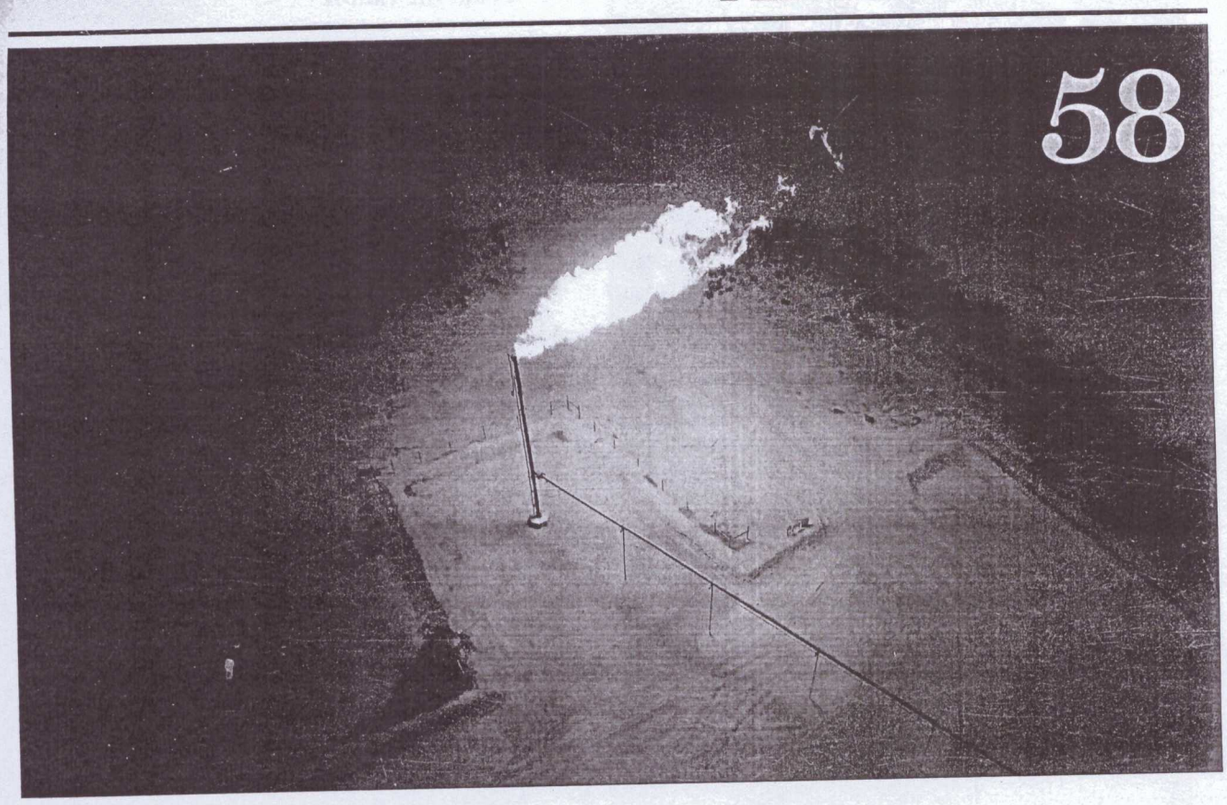

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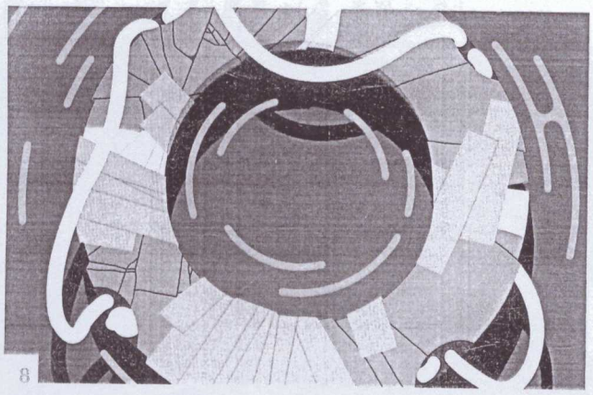

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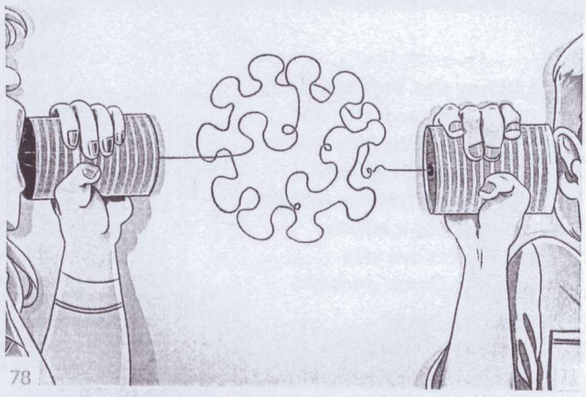

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a symposium on

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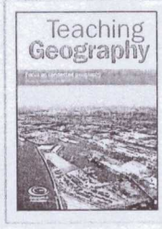

Cover Image: This issue's cover is an aerial image of Hull city and docks. Closest is the Queen Elizabeth Dock with the King George Dock behind it. On the left are the ferries which go to Zeebrugge and Rotterdam. **Photo:** *© aeroengland.co.uk*

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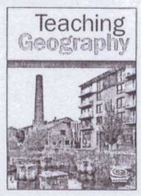

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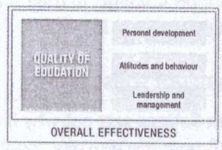

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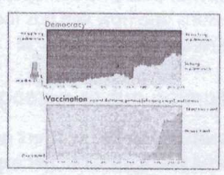

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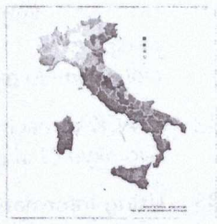

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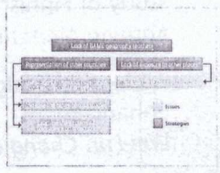

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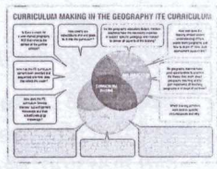

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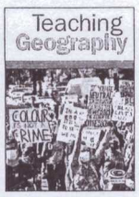

Cover image: London, 20 June 2020 – Black Lives Matter protest march from Hyde Park to Parliament Square. **Source:** © Shutterstock/Daniel Samwray.

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Exploring New Trend in Digital Learning Environment for Faculty Capacity-building: A Case for Adapting Learning Experience Platform

Munir Ahmed R* and S Sacchidanand**

Learning environment is getting modified by a variety of disruptors that range from technological innovations to human aspirations. Such a change is getting reflected as fast changing contours of learning structure; a form that is fluid and adaptive to the emerging needs and compulsions (Kinshuk, 2016). It was believed that technology has a high influence to usher innovations into learning environment (Raja, 2018), but the counter argument is that technology alone is not sufficient, and therefore a combination of social and psychological factors also impact creativity in the learning environment. Senge's (1990) places a premium on 'mental models' as one of the five aspects that shape a learning organisation. Therefore, we would like to place on record that the changing landscape of learning environment can sustain only when it makes a comprehensive attempt for integrating all possible variables that are significant to design and develop it.

In this background, Learning Management System (LMS) has acquired an existential status in the Learning and Development (L & D) industry for more than a decade. Lederman (2020) argued that the COVID-19 pandemic compelled both the teachers and students into embracing the digital academic experience. A joint report by KPMG and Google (2017) had projected India's online education market would grow from USD 247 million and 1.6 million users in 2016 to USD 1.96 billion and 9.6 million users by 2021. The pandemic might have spurred this mark to an early reach in 2020.

Though there were a great many variations in the digital learning applications during the COVID-19 in the Indian universities, LMS has been a singularly attractive proposition. In the surveys that we conducted with the faculty of our University on the adaptation of digital learning, a significant chunk had used any form of digital learning, including LMS as a transient phenomenon. As we surmise from interactions with a cross-section of such teachers, there was insufficient preparedness to migrate to the digital academic environment. Such an under preparedness had also brought in either hostility or cynicism about this whole exercise.

In this context, the 'mental model' of Senge, referred above in particular, and the five elements of Learning Organisation assume

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#Let'sBeatCoronaTogether

New Operating Model for Private Business Schools for COVID-19 and Post-COVID-19 Times

Dipak Kumar Bhattacharyya*

COVID-19 Pandemic, among others, has put private business schools in great difficulty. Being self-financing, on the one hand, these business schools are facing the challenge of new admissions, and on the other, they are now required to emphasize on internal cost efficiency. Uncertainty in managerial level job availability for MBA graduates now dissuades many prospective students to postpone their plans for higher studies and stick to their current jobs (if they are already employed). Those who do not have any job at present are getting engaged in low-end jobs, as new normal process has increased the spate of hiring for various non-managerial job positions. While front-end strategies are now compelling private business schools to increase technology-enabled delivery modules, back-end strategies are compelling these business schools to optimize their costs of operation. This article highlights such practices, along with possible adverse consequences, unless business schools sustain their identity as quality institutions, embracing suitable operating model.

India has six thousand business schools that offer MBA or PGDM (some also say PGDBM) as full-time, part-time or as distance learning mode. Going by National Institutional Ranking Framework (NIRF) ranking 2020, we find there are seventy-five business schools, which are ranked. But we have several thousands more, including some private business schools, outside the ambit of NIRF ranking. Some of these business schools are also good, but presumably not showing their eagerness to come under the lens of NIRF. However, for our purpose, NIRF being endorsed by Ministry of Education, its ranking is considered as quality indicator for institutions of higher learning. In recent business school ranking list, among top ten category, we find that only two private business schools are ranked —XLRI, Jamshedpur (ninth position), and MDI, New Delhi (tenth position). One way, this indicates that private business schools in India are gradually losing ground to government aided institutes and universities. Over the years, private business schools in India, which are roughly estimated to the tune of six hundred, showed more interests for accreditation of AACSB, ACBSP, IACBE, SQAC, etc. to establish their legitimacy as quality institutions, for influencing stakeholders' attention. Without going into their veracity, we find many unaccredited institutions today are in top rank of NIRF. NIRF ranking is now a hallmark of quality for business schools in India, for obvious change in pandemic environment, as global mobility of management graduates will get restricted, for more emerging job opportunities in India. Gradually, it will also catch recruiters' attention, as over the years NIRF has come to the stage of maturity with greater compatibility with any international level rating

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Rig Veda

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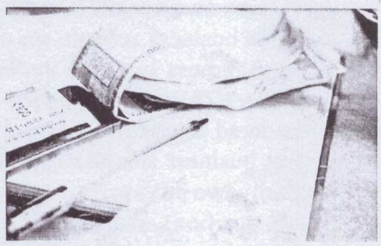

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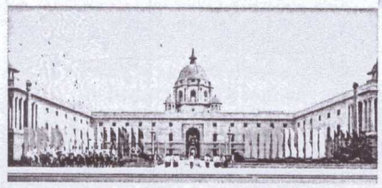

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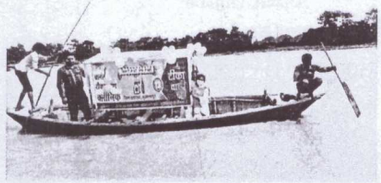

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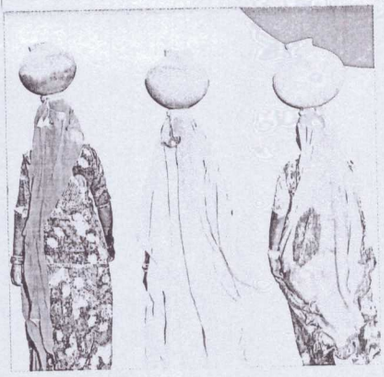

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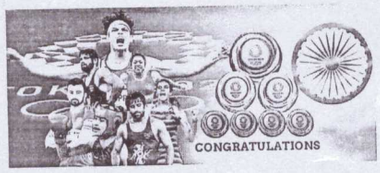

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