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Volume 653 Issue 8115, 21 May 2026

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Diversity dividend

Is there any relationship between salaries attained by graduates and the racial diversity of their classmates? This question has generated significant debate but there is a paucity of empirical evidence to help resolve it. In this week's issue, Debanjan Mitra, Peter Golder and Mariya Topchy add to that evidence by showing that students who study within racially diverse graduating classes tend to receive higher salaries upon graduation. The researchers used datasets covering two high-earning professional degrees in the USA: Master of Business Administration — show all

Cover image: Jasiek Krzysztofiak/Nature with adapted photos from Pexel and Unsplash.

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Mental-health research is too often invisible – it is time to change that

Mental illness needs visibility more urgently than almost any other area of medicine and health care. A new award from Wellcome and *Nature* aims to raise its prominence.

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Why AI cannot do good science without humans

With the arrival of 'AI scientists', it's as well to remember that human wisdom, empathy and sheer messiness are as much part of progress as are process and efficiency.

World View

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Can the 'steroid Olympics' show the sporting community how to support athletes better?

The Enhanced Games, which permits the use of performance-enhancing drugs, exposes flaws in the sporting world.

April Henning

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The Enhanced Games miss the point: science can clean up sport

An event that champions performance-boosting substances poses risks to athletes' health — and integrity. Anti-doping science must keep up.

Kim Wolff

Research Highlights

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Even mild blows to the head disrupt the microbiome

Some bacterial species became less abundant in the guts of American football players as the season progressed.

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Bespoke DNA vaccine offers hope for treatment of notorious brain cancer

The personalized treatment encourages the immune system to attack the tumours called glioblastomas.

Collection: Cancer at Nature Portfolio

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Pristine Antarctic ice records the Solar System's travels

Rare isotopes hint at when the Solar System entered the Local Interstellar Cloud.

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Dried to survive: desiccated tardigrades tolerate high heat

The famously resilient creatures can withstand temperatures of 85 °C if allowed to dry out first.

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News in Focus

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Early-career researchers do more 'disruptive' science than veterans

Analysis of papers from millions of scientists shows that older researchers tend to stick with ideas from their past.

Mariana Lenharo

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Elsevier vs Meta: first science publisher sues over scraped research papers

Science publishing giant Elsevier has joined a class-action lawsuit against Meta that alleges the reproduction of copyrighted works in developing the Llama AI model.

Elizabeth Gibney

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Ice core reveals longest-ever continuous record of Earth's climate

Data from Antarctica could help to solve the mystery of why ice ages became so brutal.

Davide Castelvecchi

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Surge in fake citations uncovered by audit of 2.5 million biomedical-science papers

An analysis of 97 million references has found that rates of fabricated citations have climbed steeply since 2023.

Miryam Naddaf

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World's largest forest research agency faces severe cutback by Trump administration

The US Forest Service has proposed closing some three-quarters of its research sites in a move that has provoked widespread fear and uncertainty.

Edward Chen

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Beyond GDP: 31 alternatives to the world's favourite measure of economic health

Proposed UN progress indicators include greenhouse-gas emissions, life expectancy and children's performance in reading and maths.

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World-leading climate centre takes Trump administration to court

Universities that run the National Center for Atmospheric Research want to keep it from being dismantled.

Alexandra Witze

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'It is incredible': How AI is transforming mathematics

Thanks to some surprising advances, mathematicians are starting to realize that artificial intelligence could radically alter their profession.

Davide Castelvecchi

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The brain's code seems to be in constant flux. Neuroscientists are baffled

Neurons fire much more erratically than researchers thought. What does that mean for how the brain works?

Diana Kwon

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Books & Arts

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Birds get a bad rap: why we should look up to our feathered friends

Many avian species are threatened, but conservation efforts and birds' high intelligence offer hope.

Richard Schiffman

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Criminals are made, not born: how when you live shapes whether you will break the law

An analysis of what makes young people more likely to commit crimes tears down the influential assumption that character is the main factor.

Christopher Browning

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J. Craig Venter obituary: maverick biotechnologist who sequenced the human genome

The entrepreneur was also a pioneer of synthetic biology.

Kevin Davies

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The uncritical adoption of AI in science is alarming – we urgently need guard rails

Artificial intelligence is rapidly accelerating scientific output, but risks narrowing inquiry, weakening judgement and undermining how scientists are trained.

Lisa Messeri & M. J. Crockett

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AI might jeopardize the uncertainty required in science

Sarah Mikula

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Support academic institutions under attack

Roozbeh Kiani, Sepiedeh Keshavarzi & Athena Akrami

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France's research-primate project goes against its own ethics panel

Cédric Sueur, Roland Cash & Virginie Courtier

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Airborne DNA can yield insights with the right techniques

Fumito Maruyama, Naomichi Yamamoto ... Stephan C. Schuster

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Meet the academics refusing to use generative AI

Researchers say they have their reasons for avoiding AI tools — and they're sick of arguing about it.

Hannah Docter-Loeb

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Engineered blood clots stop bleeding in seconds

Red blood cells have been modified to form strong clots that halt any bleeding almost instantly and then promote tissue regeneration.

Malcolm Xing & Gaoxing Luo

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Specific combinations of human and viral genetic variants explain a cancer predisposition in southern China

The interplay between variants of human immune-system genes and strains of Epstein–Barr virus underpins differences in susceptibility to an uncommon throat cancer.

Colm O'hUigin & Mary Carrington

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Genetics reveal why people respond differently to GLP-1 weight-loss drugs

Genetic variants in *GLP1R* and *GIPR*, which encode targets of GLP-1-based medications, offer insights into why responses to these drugs vary and who might face adverse effects.

Ruth J. F. Loos

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Targeted electron beam creates thousands of atomic crystal defects

An electron-beam technique that can precisely create thousands of atomic defects in a crystal could be used to build quantum devices.

Toma Susi

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Protein engineering fixes a major crop trade-off

Rational design of a regulatory protein decouples the ability to tolerate cold from the means to acquire phosphorus, effectively enhancing crop yield under cold stress.

Jie Liu & Jianbing Yan

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DNA-folding changes block production of self-directed antibodies

DNA rearrangements in immune-system B cells generate diverse antibody-encoding genes and help to avoid producing antibodies that target the body's own tissues.

Zeqian Gao & Joan Boyes

Articles

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Gaussian boson sampling with 1,024 squeezed states in 8,176 modes

A programmable photonic quantum processor, Jiuzhang 4.0, incorporates 1,024 high-efficiency squeezed states into a hybrid spatial–temporal encoded 8,176-mode circuit.

Hua-Liang Liu, Hao Su ... Jian-Wei Pan

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Imaging hidden objects with consumer LiDAR via motion-induced sampling

Researchers enable hidden-object imaging on consumer LiDAR by fusing multiple frames with a motion-based model, achieving three-dimensional reconstruction, tracking and localization using low-cost, off-the-shelf smartphone sensors.

Siddharth Somasundaram, Aaron Young ... Ramesh Raskar

Article
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Cusp-singularity-enhanced Coriolis effect for sensitive chip-scale gyroscopes

By using singularity physics to enable cubic-root scaling of frequency and phase modulations induced by the Coriolis effect to enhance the performance of chip-scale Coriolis vibratory gyroscopes, substantial improvements in signal-to-noise ratio and precision are demonstrated.

Sen Zhang, Dingbang Xiao ... Xin Zhou

Article
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Autonomous closed-loop framework for reproducible perovskite solar cells

An autonomous closed-loop framework combining machine-learning-driven materials discovery with an automated manufacturing platform is introduced for the highly reproducible production of perovskite solar cells that demonstrate high power conversion and certified maximum power point tracking efficiencies.

Danpeng Gao, Shuaihua Lu ... Zonglong Zhu

Article
13 May 2026

Mesoscale atomic engineering in a crystal lattice

Electron-beam control enables deterministic placement of tens of thousands of atomic defects in three-dimensional crystals, creating stable, programmable artificial matter for scalable quantum and nanoscale technologies.

Julian Klein, Kevin M. Roccapriore ... Frances M. Ross

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Engineering tough blood clots for rapid haemostasis and enhanced regeneration

Engineered blood clots using rapidly crosslinked red blood cells form within seconds, greatly improving toughness and adhesion while effectively stopping bleeding and enhancing tissue repair.

Shuaibing Jiang, Guangyu Bao ... Jianyu Li

Article
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Carbonyl swapping converts cyclic ketones to saturated heterocycles

A modular carbonyl replacement strategy converts common cyclic ketones into diverse saturated heterocycles, enabling efficient synthesis and late-stage diversification of bioactive molecules.

Zisheng Xue, Zhengzhao Lou ... Yan Xu

Article
20 May 2026

High-fidelity identification of guest species in porous materials

A reconstruction method based on Gaussian-apodized single-sideband electron ptychography removes artefacts to enable the high-fidelity identification of guest species in porous materials.

Qilong Feng, Liang Wang ... Yihan Zhu

Article
13 May 2026

Twenty-first century emergence of alpine fire in Central African mountains

A twenty-first century fire is shown to be the first to have affected a high-elevation region in the central African mountains in the past 12,000 years, and previous burning at mid-elevations highlights the potential role of humans in transforming Afromontane ecosystems.

Andrea L. Mason, Eleanor M. B. Pereboom ... James M. Russell

Article
Open Access
06 May 2026

Foreshock-induced slip transients set mainshock nucleation timing

Analysis of laboratory experiments using a rate-and-state-based Griffith-like rupture framework shows that foreshocks can regulate mainshock nucleation timing, with larger foreshocks generating higher transient sliding velocities and triggering a more rapid transition to dynamic rupture.

Barnaby Fryer, Dmitry Garagash ... François Passelègue

Article
29 Apr 2026

Racial diversity in higher education is associated with higher student salaries

A longitudinal study shows that racial diversity in higher education is associated with higher student salaries at graduation, indicating that policies to increase or leverage racial diversity enhance human capital and benefit society.

Debanjan Mitra, Peter N. Golder & Mariya Topchy

Article
18 Mar 2026

Contrasting thermophilization among forests, grasslands and alpine summits

Analyses of large-scale, multitaxa and long-term thermophilization patterns in forests, grasslands and alpine summits across Europe provide insight into shifts in community composition among different ecosystems in a warming world.

Kai Yue, Pieter Vangansbeke ... Pieter De Frenne

Article
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08 Apr 2026

Genetic predictors of GLP1 receptor agonist weight loss and side effects

Identification of genetic variants associated with the efficacy and side effects of GLP1 medications could underpin development of precision medicine approaches in the treatment of obesity.

Qiaojuan Jane Su, James R. Ashenhurst ... Adam Auton

Article
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29 Apr 2026

GLP-1R–GIPR–PPARα/γ/δ quintuple agonism corrects obesity and diabetes in mice

GLP-1–GIP–lanifibranor, a single-molecule agonist of GLP-1R, GIPR, PPARα, PPARγ and PPARδ, shows promising therapeutic efficacy against obesity-linked metabolic dysfunction in vitro and in mouse models via synergistic incretin and PPAR activity.

Daniela Liskiewicz, Aaron Novikoff ... Timo D. Müller

Article
Open Access
15 Apr 2026

EBV strain interacts with host HLA to drive nasopharyngeal carcinoma risk

A genome-to-genome association study identifies host and viral risk factors that interact to drive nasopharyngeal carcinoma endemicity in southern China.

Yanhong Chen, Jingtong Liang ... Miao Xu

Article
Open Access
08 Apr 2026

Population-scale repeat expansions elucidate disease risk and brain atrophy

Decreased brain volumes and increased NfL levels can be observed earlier than disease diagnosis in short-tandem-repeat-associated neurological diseases.

Vijay Kumar Pounraja, Jae Hoon Sul ... Sahar Gelfman

Article
Open Access
01 Apr 2026

DNA damage burden causes selective CUX2 neuron loss in neuroinflammation

DNA damage burden and inadequate repair in CUX2$^+$ cortical layer 2/3 excitatory neurons contributes to selective vulnerability in neuroinflammatory injury.

Laura Morcom, Wenlong Xia ... David H. Rowitch

Article
Open Access
01 Apr 2026

Expansion of outer cortical CUX2 neurons requires adaptations for DNA repair

The transcription factor ATF4 is shown to regulate double-stranded DNA repair within vulnerable CUX2$^+$ upper-layer 2/3 cortical neurons, enabling their survival during development.

Wenlong Xia, Laura Morcom ... Stephen P. J. Fancy

Article
25 Feb 2026

Rewiring an E3 ligase enhances cold resilience and phosphate use in maize

The E3 ubiquitin ligase NLA postively regulates cold tolerance and negatively regulates phosphate uptake in maize, and a genetically engineered variant of this enzyme leads to improved cold tolerance and enhanced phosphate uptake, improving yield in field trials.

Huan Liao, Xiaoyun Zhao ... Shuhua Yang

Article
08 Apr 2026

Asymmetric selection of a rice immune module and rebuild of disease resistance

Stacking XA48-mediated effector-triggered immunity with XA21-mediated pattern-triggered immunity in *Oryza sativa japonica* reconstitutes the broad-spectrum resistance from wild rice.

Hui Lin, Fudan Chen ... Zuhua He

Article
Open Access
24 Feb 2026

Dynamic antigen expression and cytotoxic T cell resistance in HIV reservoir clones

Insights into the vulnerabilities of HIV-1 reservoir clones to potent, sustained cytotoxic T cell pressure are revealed.

Isabella A. T. M. Ferreira, Alberto Herrera ... R. Brad Jones

Article
Open Access
25 Feb 2026

A membrane-bound nuclease directly cleaves phage DNA during genome injection

A widespread bacterial defence system called SNIPE is shown to localize to the cell membrane, where it identifies and cleaves the DNA of infecting phage as it is injected into the bacterial cell.

Daniel S. Saxton, Peter C. DeWeirdt ... Michael T. Laub

Article
Open Access
15 Apr 2026

Linear RAG scanning mediates editing of Igκ variable region repertoires

Studies explaining the secondary *Igk* recombination mechanism are described and Cer/Sis deletion and/or displacement is implicated as a developmental switch converting the rearrangement mechanisms from two-loop-based diffusional primary *Igk* into one-loop-based linear scanning secondary mechanisms.

Xiang Li, Hongli Hu ... Frederick W. Alt

Article
25 Mar 2026

Exposed phosphatidylserine is an inhibitory molecule in T cell exhaustion

Insights into the mechanism by which phosphatidylserine functions as a non-classical inhibitory molecule during T cell exhaustion, and how phosphatidylserine-targeting antibodies enhance T cell responses are explored.

Christopher B. Medina, Ewelina Sobierajska ... Rafi Ahmed

Article
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11 Mar 2026

Facile induction of immune tolerance by an interleukin-2–TGFβ surrogate agonist

A fusion protein designed to comprise IL-2 and a helminth-derived TGFβ mimic activates IL-2 and TGFβ signalling pathways in IL-2 receptor-expressing T cells and induces stable antigen-specific regulatory T cells in peripheral lymphoid organs.

Qinli Sun, Alison K. Barrett ... K. Christopher Garcia

Article
Open Access
10 Dec 2025

Somatic evolution following cancer treatment in normal tissue

High-depth sequencing of non-cancerous tissue from patients with metastatic cancer reveals single-base mutational signatures of alcohol, smoking and cancer treatments, and reveals how exogenous factors, including cancer therapies, affect somatic cell evolution.

Oriol Pich, Sophia Ward ... Nicholas McGranahan

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29 Apr 2026

Evolutionary characterization of lung cancer metastasis

DNA-sequencing data from primary tumours and paired metastases from participants in the TRACERx lung study and PEACE autopsy programme are used to analyse the metastatic diversity of advanced non-small cell lung cancer and the seeding patterns that underpin it.

Sonya Hessey, Abigail Bunkum ... Mariam Jamal-Hanjani

Article
08 Apr 2026

Clinical application of base editing for treating β-thalassaemia

A clinical phase 1 trial of a single infusion of CS-101, CD34$^+$ cells modified using a transformer base editor to reactivate fetal haemoglobin production, led to early and enduring transfusion independence in patients with β-thalassaemia.

Yongrong Lai, Rongrong Liu ... Jia Chen

Article
Open Access
18 Mar 2026

Catabolism of extracellular glutathione supplies cysteine to support tumours

Catabolism of extracellular glutathione by γ-glutamyltransferases supports tumour growth and survival, and pharmacological targeting of these enzymes slows tumour growth.

Fabio Hecht, Marco Zocchi ... Isaac S. Harris

Article
01 Apr 2026

Gene regulatory landscape dissected by single-cell four-omics sequencing

Combining single-cell parallel profiling of genome conformation, histone modifications, chromatin accessibility and gene expression reveals dynamics and intranuclear spatial clustering of epigenome profiles, enabling sophisticated analysis of the regulatory landscape across cell types and tissues.

Yujie Chen, Zhiyuan Liu ... Dong Xing

Article
02 Mar 2026

BCDX2–CX3 and DX2–CX3 complexes assemble and stabilize RAD51 filaments

Multiple complexes that contain various RAD51 paralogues involved in homologous recombination are revealed, highlighting the structural, functional and mechanistic importance of these complexes.

Christopher W. Koo, Jiaqi Xiao ... Stanislau Yatskevich

Article
Open Access
25 Mar 2026

Structural energetics of cold sensitivity

Data from cryogenic electron microscopy combined with hydrogen–deuterium exchange mass spectrometry inform a mechanism for cold-evoked activation of the TRPM8 channel, providing a structural and energetic framework to explain cold sensitivity.

Kevin Y. Choi, Xiaoxuan Lin ... David Julius

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Amendments & Corrections

Author Correction
Open Access
01 May 2026

Author Correction: Titration of RAS alters senescent state and influences tumour initiation

Adelyne S. L. Chan, Haoran Zhu ... Masashi Narita

Author Correction
Open Access
06 May 2026

Author Correction: Multidimensional profiling of heterogeneity in supratentorial ependymomas

Daeun Jeong, Sara G. Danielli ... Mariella G. Filbin

Author Correction
06 May 2026

Author Correction: Enteric neurons increase maternal food intake during reproduction

Dafni Hadjieconomou, George King ... Irene Miguel-Aliaga

Author Correction
07 May 2026

Author Correction: Proteasome-guided haem signalling axis contributes to T cell exhaustion

Yingxi Xu, Yangtao Shangguan ... Ping-Chih Ho

Editorial Expression of Concern
05 May 2026

Editorial Expression of Concern: Nociceptive neurons promote gastric tumour progression via a CGRP–RAMP1 axis

Xiaofei Zhi, Feijing Wu ... Timothy C. Wang

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Chemistry

Chemistry research is undergoing a period of transformation, driven by new technologies and mounting environmental pressures.

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