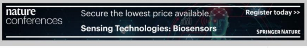
Advertisement


nature conferences
Secure the lowest price available
Sensing Technologies: Biosensors
Register today >>
SPRINGER NATURE

nature

View all journals | Saved research | Search | Log in

Explore content | About the journal | Publish with us | Subscribe | Sign up for alerts | RSS feed

nature > volumes > volume 659 > issue 8140

Volume 659 Issue 8140, 12 November 2026

← Previous issue | Volume 659

nature
MATERIAL GAINS

Subscribe

Material gains

The intricate connections and complexities of real-world interactions — from social-media relationships and the Internet to chemical and biological systems — have been illuminated by network science. In this week's issue, Albert-László Barabási and colleagues offer a different use for this discipline: the design of metamaterials. Rods of varying lengths and thicknesses are connected in mathematically predictable ways to create metamaterials that the researchers describe as 'scale-rich': the widths and number of connections span several orders of magnitude. — show all

Cover image: Csaba Both and Albert- László Barabási.

Table of Contents

This Week
News in Focus
Books & Arts
Opinion
Work
Research
Amendments & Corrections
Spotlight

This Week

Editorial

Editorial
11 Nov 2026

Biotech innovations are an opportunity to limit climate change

Agricultural biotechnology once found itself in opposition to environmental science. Now it could reduce the impact of food systems on global warming and biodiversity loss.

Editorial
10 Nov 2026

Metascience should be a source of evidence, not a means of control

The field has captured the interest of politicians. There are positives — but governments must not misuse the data.

World View

World View
06 Nov 2026

'Mathematics is more than a mechanical process' – why I think the field will survive OpenAI's disruption

Artificial intelligence could take the field into new territory, but researchers must create the rules and institutions that keep humans at its centre.

Ursula Martin

World View
10 Nov 2026

Why your physics project needs an anthropologist

Picking a site for an observatory should be about more than science. Humanities scholars have a crucial role in responsible siting.

Jaco de Swart

Research Highlights

Research Highlight
06 Nov 2026

Cholera bacterium's good deed: inspiring a glue with rare properties

An adhesive that binds strongly even under water was inspired by a protein made by a feared pathogen.

Research Highlight
04 Nov 2026

First-of-its-kind planetary wreckage holds clues to our Solar System's fate

Astronomers spot an unprecedented double disk of debris around a dead star.

Research Highlight
03 Nov 2026

Historic Marburg outbreak hints at long-term viral hideout

Sequencing of Marburg virus collected during Ethiopia's first outbreak suggests that the pathogen is lurking in East and Central Africa.

Research Highlight
04 Nov 2026

Why not to wait even a few minutes before fleeing a tsunami

Simulation shows that hesitating can be the difference between making it to safety and not.

Top of page ⤴

News in Focus

News

News
04 Nov 2026

'Historic change': what the 2026 US mid-term election results mean for science

Researchers hope that US lawmakers will push back against the Trump administration's science policies — but there are limits to what Congress can do.

Dan Garisto & Max Kozlov

News
02 Nov 2026

'A perfect scientist, a perfect mum': researchers mourn two biologists' deaths in Spanish train crash

Scientists pay tribute to Marta Shahbazi Alonso and Tamara González Costa, who died on their way to a developmental-biology meeting.

Miryam Naddaf

News
03 Nov 2026

Chinese doctoral students in clinical medicine can graduate without a thesis – more degrees to follow

Postgraduate students studying professional medicine degrees can qualify with a 'practical achievement'.

Xiaoying You

News
03 Nov 2026

Biotech firms are meant to pay to use Earth's genetic data. They're not.

Global leaders at the COP17 biodiversity summit complained that companies using public genetic data are not paying into a voluntary fund to protect nature.

James Dinneen

News
30 Oct 2026

Record-breaking retraction: scholarly publisher pulls 1,400 conference papers on one day

Announcement by IEEE follows publication of a study showing the retracted papers are linked to paper mills.

Miryam Naddaf

News
04 Nov 2026

AI agents run this automated biology lab that sequences DNA and more

Self-driving lab in China requires only a simple prompt to encode messages in DNA and read them out.

Heidi Ledford

News
04 Nov 2026

Toothbrush zaps bacteria with electricity that's made when bristles move

Innovative polymer could give the manual toothbrush its first radical redesign in more than 1,000 years.

Elizabeth Gibney

Features

News Feature
11 Nov 2026

Retractions of old papers are on the rise: when should bad science be culled?

Decades-old papers are increasingly being pulled from the literature, bringing a host of challenges.

Dyani Lewis

News Feature
10 Nov 2026

Some people are resistant to dementia – here's what their genes can teach us

For years, researchers have studied people with a genetic predisposition to Alzheimer's and other dementias. They might have even more to learn from those who don't get the disease.

Alison Abbott

Top of page ⤴

Books & Arts

Book Review

Book Review
09 Nov 2026

AI has transformed maths – this is how we got here

The story of how maths came to run the world, and created the artificial-intelligence models that might surpass human mathematicians.

Anil Ananthaswamy

Book Review
09 Nov 2026

Carlo Rovelli says fundamental physics is overrated

The theoretical physicist unpacks the need for more humility in science and whether artificial intelligence could ever become conscious.

Chris Stokel-Walker

Book Review
06 Nov 2026

Medicinal plants, lessons from mushrooms and the power of smell: Books in brief

Andrew Robinson reviews five of the best science picks.

Andrew Robinson

Top of page ⤴

Opinion

Comment

Comment
10 Nov 2026

How microbes can secure the critical minerals the world needs

To sustain supplies of key metals, policymakers should support the infrastructure needed to deploy mining biotechnologies on a large scale.

Gerhard Schenk, Paul Evans ... Susan T. L. Harrison

Comment
09 Nov 2026

The super El Niño is more than a climate shock – it's a health one, too

Food shortages and disease outbreaks are to be expected and need to be addressed together.

Eoin McLaughlin & Matthias Beck

Correspondence

Correspondence
10 Nov 2026

Students need AI-free spaces to learn core skills

Pablo Neira-Castro

Correspondence
10 Nov 2026

Chile's postdoc rules risk driving talent away

Eduardo Castro-Nallar, Juan Cristóbal Opazo & Cristóbal Galbán-Malagón

Correspondence
10 Nov 2026

PhD funding mechanisms should protect the right to disagree with supervisors

Nicolás C. Zanetta-Colombo

Top of page ⤴

Work

Column

Career Column
28 Oct 2026

The shifting sands of research independence: why mid-career scientists crave security

A project to improve understanding of an often-neglected group in academia aims to help its members to navigate career uncertainty.

Karen Hinxman

Series: Resources for mid-career scientists

Top of page ⤴

Research

News & Views

News & Views
28 Oct 2026

Genetic variants that alter gene regulation in specific cell types are closely tied to disease

Single-cell profiling of nearly 2,000 people brings scientists closer to understanding the link between genetic variation, gene expression and health.

Heini M. Natri & Nicholas E. Banovich

News & Views
11 Nov 2026

Extraordinary materials shaped by the principles of complex networks

Network science has inspired the design of materials that spread out their deformation when a force is applied, have tunable stiffness and can control vibrational waves.

Marco Paggi

News & Views
11 Nov 2026

Getting a grasp on the global wildlife trade

A study reports that about 107,000 species are traded worldwide, legally or illegally — more than double a previous estimate.

Mary Abraham

News & Views
28 Oct 2026

Lactate takes a shortcut into mitochondria to power the heart

A cellular fuel called lactate is channelled directly into energy-generating organelles in heart muscle, defying the prevailing view about lactate transport.

Trace Thome & Zolt Arany

News & Views
21 Oct 2026

Worms live longer in cool conditions thanks to a muscle-derived molecule

In nematodes, a metabolite induced by the cold links low temperatures to a body-wide signal that promotes longevity. This signalling system is also seen in human cells.

Hanseul Lee & Seung-Jae V. Lee

News & Views
28 Oct 2026

Accounting of Africa's water reveals a management gap

A map of Africa's water demand reveals that the scarcity of water is only part of the problem facing the continent — management is a separate challenge.

Xu Wang

Articles

Article
Open Access
11 Nov 2026

Independent interferometric observable confirms black hole shadow in M87*

An imaging algorithm using closure-invariant formalism and diffusion-based reconstruction applied to supermassive black hole very long baseline radio interferometry datasets enables independent recovery of the ring-like shadow and mass that is free from the usual calibration and imaging assumptions.

Samuel Lai, Nithyanandan Thyagarajan ... Foivos Diakogiannis

Article
04 Nov 2026

Observation of prethermal dynamical phase transitions and resonant melting

A programmable neutral-atom quantum simulator is used to explore quench dynamics in spin models with up to 180 qubits, revealing prethermal dynamical phase transitions and resonant melting.

Siva Darbha, Alexey Khudorozhkov ... Milan Kornjača

Article
04 Nov 2026

Hard X-ray attosecond metrology

Metrology techniques are developed to characterize and control attosecond hard X-ray pulses, directly measuring a 170-attosecond duration and enabling ultrafast studies of electronic dynamics in quantum systems.

Yanwen Sun, River Robles ... Diling Zhu

Article
04 Nov 2026

Conjugation-regulated self-assembled molecules for tandem solar cells

Rationally engineered molecular spatial conjugation is used for the formation of highly ordered, conformal self-assembled molecules, enabling the fabrication of high-performance perovskite/silicon tandem solar cells.

Zheng Fang, Zhijie Rao ... Xiaohong Zhang

Article
Open Access
11 Nov 2026

Scale-rich network-based metamaterials

A network-science-based framework that embeds network heterogeneity into mechanical metamaterials is used to produce scale-rich metamaterials that exhibit properties inaccessible to traditional single-scale systems.

Csaba Both, Andrew Yen-Jong Chen ... Albert-László Barabási

Article
Open Access
04 Nov 2026

Towards observing interstitial hydrogen in solution in metal lattices

Using deuterium as a proxy for hydrogen, atom probe tomography provides experimental evidence for interstitial hydrogen in solid solution across different FCC phases, consistent with theoretical predictions of hydrogen affinity, revealing hydrogen partitioning in structural alloys.

Chao Huang, Saiyu Liu ... Eason Yi-Sheng Chen

Article
04 Nov 2026

A two-dimensional reticular triaxial molecularly woven fabric

A two-dimensional reticular triaxial woven network material is constructed by incorporating C_3-symmetric macrocycles into a triangular weave pattern, enabling an extra topological dimension to be used for the construction of functional materials.

Mengbin Wang, Shuai Fang ... Feihe Huang

Article
Open Access
11 Nov 2026

Non-halogen aqueous electrolytes for four-electron iodine conversion

An electrolyte framework that harnesses anionic chemistry to coordinate the interfacial microenvironment and molecular interactions enables reversible four-electron iodine conversion in halogen-free aqueous electrolytes, and is validated in metal–iodine batteries.

Ruwei Chen, Haobo Dong ... Guanjie He

Article
23 Sept 2026

Chiral oxazolidinones via biocatalytic aziridination of unactivated alkenes

A biocatalytic aziridination and ring-expansion cascade enables direct, enantioselective synthesis of clinically relevant and discovery-stage chiral oxazolidinones from simple alkenes.

Zi-Qi Li, Deirdre Hanley ... Frances H. Arnold

Article
Open Access
28 Oct 2026

Spatial and sectoral water demand assessment for the African continent

Africa-wide water demand analysis across six sectors in 2020 shows that in specific regions of northern and southern Africa, the current water demand exceeds water availability.

Davy Vanham, Dahami Gunathilake ... Simon Langan

Article
07 Oct 2026

Australia’s current wildfire crisis linked to colonial land-use change

A 1,000-year lake-sediment record from southeastern Australia shows that colonial disruption of Indigenous cultural burning transformed open woodland into dense, flammable forest, priming the landscape for today’s climate-driven wildfires.

Michael-Shawn Fletcher, Anthony Romano ... Russell Mullett

Article
30 Sept 2026

Evolution of terrestrial anatomy revealed by a derived stem tetrapod

New anatomical evidence reclassifies *Westlothiana* as an aquatic stem tetrapod, showing that terrestrial limb adaptations evolved mosaically in transitional amphibious environments before crown tetrapods emerged.

Ben Igielman, Xavier Jenkins ... Roger Benson

Article
26 Aug 2026

Amphibious stem-insect sheds light on colonization of land

Restudy of a challenging fossil using cross-polarized light imaging and phylogenetic reconstruction identifies *Chosha praecursor*, a probable early-diverging insect, helping to bridge the longstanding ‘hexapod gap’ in the fossil record.

Erik Tihelka, Carlos Vásquez ... Chenyang Cai

Article
Open Access
28 Oct 2026

Rare and common genetic variants shape single-cell immune gene expression

Phase 1 of TenK10K takes single-cell RNA sequencing and matched whole-genome sequencing data from 1,925 individuals, enabling detection of associations for common and rare genetic variants, the latter of which have been uncharacterized in their impact on cell-specific gene expression.

Anna S. E. Cuomo, Eleanor Spenceley ... Joseph E. Powell

Article
Open Access
28 Oct 2026

Genetic variants shape single-cell chromatin accessibility and disease risk

Single-cell chromatin accessibility profiling identifies cell-type-specific and cell-state-specific genetic effects that link non-coding variants to immune disease risk.

Angli Xue, Jianan Fan ... Joseph E. Powell

Article
28 Oct 2026

Tandem repeat variation shapes immune cell type-specific gene expression

Whole-genome sequencing and cell-level gene expression measurements show that length variation in tandem repeats in the human genome contributes to cell type-specific differences in gene regulation and expression, as well as the architecture of complex traits.

Hope A. Tanudisastro, Anna S. E. Cuomo ... Daniel G. MacArthur

---

Article
Open Access
26 Aug 2026

Cell-type-specific eQTLs underlie the genetic architecture of complex traits

Single-cell RNA-sequencing shows that cell-type-specific expression quantitative trait loci drive much of complex trait heritability, highlighting cell-type-specific gene regulation as key to linking genetic variants with traits.

Minhui Chen, Xinpei Wang ... Andy Dahl

Article
Open Access
16 Sept 2026

Topographic structure and function of locus coeruleus noradrenaline neurons

Dorsal and ventral noradrenergic neurons in the locus coeruleus form topographic subpopulations whose projection patterns and activity encode choice switching, reward-prediction errors and disregard of reward-predictive cues, supporting flexible learning behaviour.

Zhixiao Su, Polina Kosillo ... Jeremiah Y. Cohen

Article
14 Oct 2026

Elp1 is required for myeloid differentiation and brain repopulation

Primary cultured haematopoietic stem and progenitor cells are used to analyse the molecular mechanisms of brain myeloid differentiation, and this platform enabled the identification of elongation factor ELP1 as an important regulator of this process.

Marius Marc-Daniel Mader, Wanhua Li ... Marius Wernig

Article
Open Access
21 Oct 2026

Cold activates a BH2 metabolic network promoting longevity and proteostasis

A multi-tissue signalling system links cold temperature to enhanced longevity and proteostasis in *Caenorhabditis elegans*.

Hyun Ju Lee, Cansu Doğan ... David Vilchez

Article
Open Access
30 Sept 2026

γδ T cell receptor dependencies define a unique immunosurveillance modality

Tissue-resident γδ T cells mount rapid, innate-like stress responses that require γδ T cell receptor signalling, revealing lineage-specific receptor dependence that underpins their conserved roles in immunosurveillance and informs therapeutic deployment.

Nicolas Veland, Bethania Garcia-Cassani ... Miguel Muñoz-Ruiz

---

Article
Open Access
30 Sept 2026

Transcription pause and elongation regulators mediate somatic hypermutation

The molecular factors and mechanisms that mediate the chromatin recruitment of activation-induced deaminase and the generation of its stalled polymerase II substrate during somatic hypermutation are identified.

Lizhen Wu, Anurupa Devi Yadavalli ... David G. Schatz

Article
30 Sept 2026

Histone readers MLLT1 and MLLT3 concentrate AID to confer locus specificity

By being restricted to target regions by MLLT1–MLLT3 occupancy, activation-induced deaminase activity is able to avoid most off-target mutagenesis during B cell somatic hypermutation.

Noé Seija, Sophia Gannon ... Javier M. Di Noia

Article
Open Access
28 Oct 2026

MCT1-dependent mitochondrial lactate import sustains cardiac metabolism

In mouse myocardium, glucose oxidation persists in the absence of the mitochondrial pyruvate carrier, with mitochondrial MCT1 importing lactate into mitochondria and LDHB oxidizing it to pyruvate and NADH, sustaining cardiac energetics and preventing stress-induced heart failure.

Ahmad A. Cluntun, Joseph R. Visker ... Gregory S. Ducker

Article
Open Access
16 Sept 2026

Targeted genomic integration and rearrangement using prime assembly

Prime assembly enables RNA-guided integration of medium-to-large DNA sequences in human cells without requiring double-strand breaks or cell cycle progression, and supports exon recoding, transgene insertion and megabase-scale rearrangements.

Sébastien Levesque, Nozomu Kawashima ... Daniel E. Bauer

Article
07 Oct 2026

Cryo-EM structure of a methanogen nitrogenase–PII protein supercomplex

Cryo-electron microscopy of a nitrogenase supercomplex from a methane-producing archaeon reveals a mechanism in which PII proteins drive assembly of such structures to regulate nitrogenase activity in response to nitrogen availability.

Rajnandani Kashyap, Thomas M. Deere ... Edwin Antony

Top of page ⤴

Amendments & Corrections

Author Correction
27 Oct 2026

Author Correction: A chemical defence against phage infection

Sarah Kronheim, Martin Daniel-Ivad ... Karen L. Maxwell

Author Correction
23 Oct 2026

Author Correction: DYNLL1 binds to MRE11 to limit DNA end resection in BRCA1-deficient cells

Yizhou Joseph He, Khyati Meghani ... Dipanjan Chowdhury

Top of page ⤴

Spotlight

Spotlight
11 Nov 2026

Energy

As global energy demand continues to grow, countries across the world are looking for solutions that can deliver both sustainability and security.

Top of page ⤴

Nature (*Nature*) | ISSN 1476-4687 (online) | ISSN 0028-0836 (print)

About Nature Portfolio
About us
Press releases
Press office
Contact us

Discover content
Journals A-Z
Articles by subject
protocols.io
Nature Index
Nature Books

Publishing policies
Nature portfolio policies
Open access

Author & Researcher services
Reprints & permissions
Research data
Language editing
Scientific editing
Nature Masterclasses
Research Solutions

Libraries & institutions
Librarian service & tools
Librarian portal
Open research
Recommend to library

Advertising & partnerships
Advertising
Partnerships & Services
Media kits
Branded content

Professional development
Nature Awards
Nature Careers
Nature Conferences

Regional websites
Nature Africa
Nature China
Nature India
Nature Japan
Nature Middle East

Privacy Policy
Use of cookies
Your privacy choices/Manage cookies
Legal notice
Accessibility statement
Terms & Conditions
Your US state privacy rights

© 2026 Springer Nature Limited