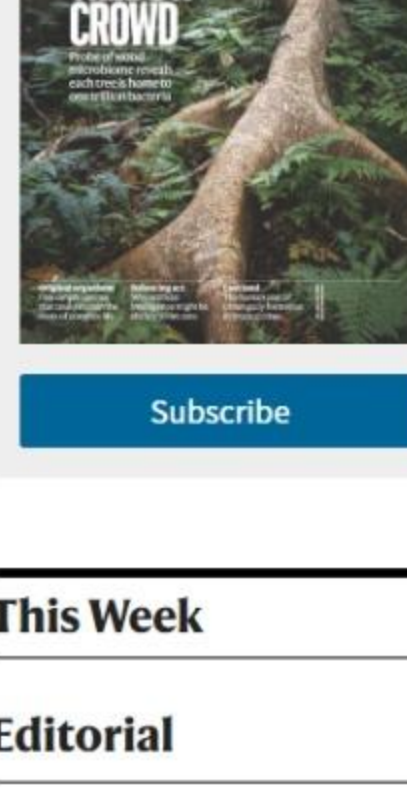


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Previous Issue Volume 644



'Tree's a crow' The wood of living trees is the biggest reservoir of biomass on Earth, but its microbiome has largely been unexplored. In this week's issue, Wyatt Arnold, Jonathan Gewirtzman and colleagues probe this uncharted territory, revealing a wealth of microorganisms that make trees their home. The researchers took samples from more than 150 trees in the northeastern United States and found that one tree plays host to about one trillion bacteria in its wood, noting that the microbiomes were adapted to wood and specialized to individual host tree species. They — 2025.01

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Editorial

Hazardous science that helps to save and improve lives needs more support Research into the growing environmental problem of urban gullies highlights the challenging conditions under which many socially important studies are done.

World View

NASA's Earth-observing satellites are crucial — commercial missions cannot replace them Private companies can track many changes on Earth from space, but both public and commercial satellite missions are needed to understand and protect the environment.

Research Highlights

- Human brain organoids reveal new path for Alzheimer's drugs Organ models with hallmarks of the disease show marked improvement when a protein's levels are restored.
Water in the 'Devil's Comet' shares a source with Earth's oceans Chemical profiling traces the source of water in one of the brightest known comets to keep returning to the Solar System.
The world's largest methane emitter manages to curb one source Output of the powerful greenhouse gas by China's energy sector peaked in 2014, an inventory shows.
Tiny Australian predator defies drought to recover from near-extinction Rat-sized carnivore called the amputa makes speedy comeback despite unprecedented drought.

News in Focus

News

- Brain editing now 'closer to reality': the gene-altering tools tackling deadly disorders Stunning results in mice herald gene-editing advances for neurological diseases.
When will dengue strike? Outbreaks sync with heat and rain Analysis uncovers seasonal patterns of the mosquito-borne disease across the Americas, which could anticipate future outbreaks.
Controversial quantum computing paper gets hefty correction — but concerns linger The journal Science has lifted an expression of concern on a paper claiming evidence of Majorana quasiparticles and added new details.
Why chocolate tastes so good: microbes that fine-tune its flavour Manipulating the microbial communities involved in cocoa-bean fermentation could make chocolate even more delicious.
AI helps assemble 'brain' of future quantum computer As a demonstration, artificial-intelligence system helps to make a miniature, high-speed animation of physicists' favourite feline.
A brain-reading brain implant that comes with password protection A brain-computer interface decodes in near-real time the imagined speech of people who have difficulty enunciating words.
The protein craze: scientists talk supplements — and who should take them Most people can get enough protein from food, but certain groups can benefit from protein powders and related products.
Watch rappelling robots dive into a lava tube — for science Test run shows how a team of three autonomous robots could search for extraterrestrial environments suitable for sheltering humans.

Features

How did life get multicellular? Five simple organisms could have the answer Single-celled species that often stick together in colonies have researchers rethinking the origin of animals.

Autism is on the rise: what's really behind the increase? IFF is now vowed to find out what's responsible, but scientists say he is opening answers from decades of research.

Books & Arts

Book Review

How a self-taught biologist transformed nature writing — and inspired Darwin Gilbert White's journals reveal his intimate relationship with his surroundings — and call attention to changes wreaked by climate change today.

How a fraudulent scientist faked his career and other cautionary tales Books in brief Andrew Robinson reviews five of the best science picks.

Essay

Einstein hated entanglement — and five other quantum myths There's nothing intuitive about quantum theory — six physicists debunk some of the most common misconceptions.

Opinion

Obituary

David Nabarro obituary: global-health leader who fought malnutrition, malaria, Ebola and COVID-19 Persistent physician who brought research evidence to the heart of global policy decisions.

Comment

Net zero needs AI — five actions to realize its promise Without artificial intelligence technologies, balancing human-caused greenhouse-gas emissions with carbon removals by 2050 is out of reach. Action in five areas is needed to keep this goal alive.

Climate models need more frequent releases of input data — here's how to do it Annual updates to 'climate forcing' data sets would allow simulations to keep pace as global warming accelerates.

Correspondence

- Emotional AI is here — let's shape it, not shut it Hadar Fisher
Label political AI and audit its hidden costs Andres Hernandez-Serna
Deep brain stimulation data need public oversight Alberto Prión & Sara Margolia
Arguments for blind peer review also need to be recognized Daniele Roberto Giacobbe

Work

Feature

My moonshot to preserve endangered species Coral cryobiologist Mary Hagedorn wants to bank biological samples at the frozen lunar south pole.

Where I Work

I crawl coastlines to study the impacts of microplastics on marine life Biologist Lorenzo Cocolino examines how these tiny particles are affecting the behaviour and physiology of molluscs, crustaceans and seaweeds.

Research

News & Views

- Gully formation in cities is displacing tens of thousands of people Gullies are incising into rapidly developing tropical cities. An analysis in the Democratic Republic of the Congo casts light on the extent and effect of this on city dwellers.
Origins of life: the molecules that could have unlocked peptide synthesis For life to emerge on Earth, peptides must first have formed without the aid of enzymes — but how? Reactions of sulfur-containing molecules might have been key.
Genome doubling fuels ovarian cancer evolution and immune dysregulation Single-cell analysis reveals the extent of genome doubling in ovarian cancer, its variability and its role in enabling tumours to evade the immune system.
Could machine learning help to build a unified theory of cognition? Two distinct computational approaches provide opportunities for bringing together different theories of cognition.
Breaking point: mechanical stress helps NiNi1 protein to rupture membranes The protein NiNi1 enables cells to break open during certain types of cell death. Misulation of physical forces on the membrane reveals how NiNi1 acts.
A baby benefits from personalized gene editing in the clinic An infant with an inherited life-threatening metabolic condition has responded to a tailored therapy that uses the gene-editing tool CRISPR to correct a specific mutation.
Machine-learning model generates images using light An optical system that induces random fluctuations in a laser beam could be faster and more efficient at generating images than conventional computers are.

Articles

- Realization of a doped quantum antiferromagnet in a Rydberg tweezer array A doped quantum antiferromagnet is obtained by using a Rydberg tweezer array comprising three levels encoding spins and holes to implement a tunable model that allows the study of previously inaccessible parameter regimes.
Optical control of resonances in temporally symmetry-broken metasurfaces The ultrafast optical control of resonances in temporally symmetry-broken metasurfaces allows resonances to be created, annihilated or programmably manipulated, which is useful for applications that require active real-time tunability.
Optical generative models Optical generative models are demonstrated for the rapid and power-efficient creation of never-seen-before images of handwritten digits, fashion products, butterflies, human faces and Van Gogh-style artworks.
Efficient perovskite/silicon tandem with asymmetric self-assembly molecule An asymmetric self-assembled monolayer improves the efficiency of perovskite/silicon tandem solar cells compared with symmetric self-assembled monolayers, resulting in a certified power conversion efficiency of up to 34.58%.
n-Type thermoelectric elastomers A microphase crosslinking strategy, leveraging aziridine-based crosslinkers, is used to render organic thermoelectric materials stretchable and elastic.
Atomic dynamics of gas-dependent oxide reducibility Environmental transmission electron microscopy reveals distinct atomistic pathways for the reduction of NiO to metallic Ni by CO and H2, with H2 more effective in transforming the entire bulk material.
Thioester-mediated RNA aminoacylation and peptidyl-RNA synthesis in water Aminoacyl-thiols reacting selectively with RNA diols over amine nucleophiles and demonstration of chemically controlled formation of peptidyl-RNA in water at neutral pH suggest an important role for thiol cofactors before the evolution of enzymes.
The geologic history of marine dissolved organic carbon from iron oxides A direct proxy for past dissolved organic carbon signatures using co-precipitated organic carbon in iron oxides enables reconstruction of marine dissolved organic carbon signals dating back to the Palaeoproterozoic.
Mapping urban gullies in the Democratic Republic of the Congo An assessment at the scale of the Democratic Republic of the Congo shows that urban gullies are a growing problem, with 118,600 people displaced between 2004 and 2023.
Temperature-related hospitalization burdens under climate change Temperature-related risks among the climate-sensitive diseases in northeastern and southwestern China have been historically high, with associated hospitalization burdens projected to rise consistently.
Immigrant-native pay gap driven by lack of access to high-paying jobs Data from nine European and North American countries reveal that the disparity in earnings between immigrants and natives is largely a result of segregation of immigrant workers into lower-paying jobs.
Adaptations for strength in the Jurassic ichthyosaur Temnodontosaurus Analysis of a fossilized front flipper of the Jurassic ichthyosaur Temnodontosaurus shows that pectoral divergence converges to shape phenotypic space, producing the potential for both strongly buffered phenotypes and sudden bursts of phenotypic change.
Discovering cognitive strategies with tiny recurrent neural networks Modeling biological decision-making with tiny recurrent neural networks enables more accurate predictions of animal choices than classical cognitive models and offers insights into the underlying cognitive strategies and neural mechanisms.
A foundation model to predict and capture human cognition A computational model called Centaur, developed by fine-tuning a language model on a huge dataset called Psych-101, can predict and simulate human nature in experiments expressible in natural language, even in previously unseen situations.
Morphodynamics of human early brain organoid development Human brain morphodynamics are explored using organoids.
How short peptides disassemble tau fibrils in Alzheimer's disease Cryo-electron and atomic force microscopy shed light on how fibrils of the protein tau, which accumulate in the brain of people with Alzheimer's disease, can be disassembled by short peptides providing a possible route towards developing treatments.
Functional regimes of soil pH leads to a generalizable model of the soil microcosm comprising three functional regimes with distinct mechanisms linking environmental change to metabolite dynamics.
Diverse and distinct microbiome inside living trees Microbiomes of living trees show that a single tree can host approximately one trillion bacteria, with microbial communities distinctly partitioned between hardwood and sapwood and with minimal similarity to other tissues or ecosystem components.
Prophages block cell surface receptors to preserve their viral progeny Zfp promotes the accumulation of H. pylori in bacterial lysosomes, safeguarding phage progeny.
Microbiota-driven antitumour immunity mediated by dendritic cell migration A newly identified bacterial strain (Y3328) isolated from the faeces of patients who responded to immune checkpoint blockade therapies can promote antitumour immunity through the activation of tumour-specific CD8+ T cells.
Nutrients activate distinct patterns of small-intestinal enteric neurons Calcium imaging of the mouse jejunum shows that specific nutrients in the intestinal lumen are detected by epithelial cells, which activate specific sets of enteric neurons through a serotonin-mediated signalling process.
Ongoing genome doubling shapes evolvability and immunity in ovarian cancer A single-cell sequencing study using more than 30,000 tumour genomes from human ovarian cancers shows that whole-genome doubling is an ongoing mutational process that drives evolution and disrupts immunity.
NiNi1 regulates plasma membrane rupture by altering membrane biomechanical properties, independent of cell death programs.
Barcoded viral tracing identifies immunosuppressive astrocyte-glioma interactions Using viral barcode tracing to detect interactions between glioblastoma cells and non-malignant astrocytes in patient samples, investigators discovered a pathway that reduces tumour-specific immunity and identified potential therapeutic targets.
Cryo-EM structure of a natural RNA nanocage Three-dimensional structures of two natural RNA nanocages reveal unique quaternary structures without the contribution of proteins.

Amendments & Corrections

Retraction Note: Parkin and PINK1 mitigate STING-induced inflammation

Collections

- Nature Outlook Skin The skin is the largest organ of the human body, and it performs a wide variety of crucial functions.
Career Guide Texas Texas has always been central to America's space story and its influence is only growing.

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