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Volume 580, Issue 7804, 23 April 2020

1. **The high obliquity and low rotation period of the Kuiper belt object (2014) MU69 and other similar contact binaries is successfully reproduced from the collision and post-collision characteristics of initially wide binaries.**
Evgeni Grishin, Uri Malamud & Christoph M. Schäfer
2. **Unidirectional radiation is achieved in a photonic crystal slab without the use of mirrors by merging a pair of topological defects carrying half-integer charges.**
Xuefan Yin, Jicheng Jin & Bo Zhen
3. **Optical spectroscopy is used to probe correlated electronic states in a moiré heterostructure, showing many-body effects such as strong layer paramagnetism and an incompressible Mott-like state of electrons.**
Yuya Shimazaki, Ido Schwartz & Ataç Imamoğlu
4. **Enhanced switchable ferroelectric polarization is achieved in doped hafnium oxide films grown directly onto silicon using low-temperature atomic layer deposition, even at thicknesses of just one nanometre.**
Suraj S. Cheema, Daewoong Kwon & Sayeef Salahuddin
5. **The polarization direction of a ferroelectric-like state can be used to control the conversion of spin currents into charge currents at the surface of strontium titanate, a non-magnetic oxide.**
Paul Noël, Felix Trier & Jean-Philippe Attané
6. **Oppositely charged colloidal particles are assembled in water through an approach that allows electrostatic interactions to be precisely tuned to generate macroscopic single crystals.**
Theodore Hueckel, Glen M. Hocky & Stefano Sacanna
7. **Immediately before and during the eruption of Kīlauea Volcano in May 2018, anomalously high rainfall increased the pore pressure in the subsurface to its highest level in 50 years, causing weakening and mechanical failure of the edifice.**
Jamie I. Farquharson & Falk Amelung
8. **Using annual projections of temperature and precipitation to estimate when species will be exposed to potentially harmful climate conditions reveals that disruption of ecological assemblages as a result of climate change will be abrupt and could start as early as the current decade.**
Christopher H. Trisos, Cory Merow & Alex L. Pigot
9. **An infinite number of alternative diversification scenarios—which may have markedly different, but equally plausible, dynamics—can underpin a given time-calibrated phylogeny of extant species, suggesting many previous studies have over-interpreted phylogenetic evidence.**
Stilianos Louca & Matthew W. Pennell
10. **Using lipid residues absorbed in potsherds, the ages of pottery from various archaeological sites are determined and validated using sites for which the dates are well known from other methods.**
Emmanuelle Casanova, Timothy D. J. Knowles & Richard P. Evershed
11. **Experiments in mice show that a population of neurons in the vagal ganglia respond to the presence of glucose in the gut and connect to neurons in the brainstem, revealing the circuit that underlies the neural basis for the behavioural preference for sugar.**
Hwei-Ee Tan, Alexander C. Sisti & Charles S. Zuker
12. **Temozolomide therapy seems to lead to mismatch repair deficiency and hypermutation in gliomas, but not to an increase in response to immunotherapy.**
Mehdi Touat, Yvonne Y. Li & Keith L. Ligon
13. **Single-cell RNA-sequencing analysis of intestinal mesenchyme identified a population of fibroblasts that produce prostaglandin E2, which, when disrupted, prevented initiation of intestinal tumours.**
Manolis Roulis, Aimilios Kaklamanos & Richard A. Flavell
14. **Phosphorylation of INSIG1 and INSIG2 by PCK1 leads to a reduction in the binding of sterols, the activation of SREBP1 and SREBP2 and the downstream transcription of lipogenesis-associated genes that promote tumour growth.**
Daqian Xu, Zheng Wang & Zhimin Lu
15. **Shugoshin and MAD2 regulate separase-mediated chromosome separation during mitosis, in parallel to a previously identified mechanism involving the anaphase inhibitor securin.**

Susanne Hellmuth, Laura Gómez-H & Olaf Stemmann

16. **If early mitosis is too short, separase induces apoptosis by cleaving MCL2 and BCL-XL, thereby eliminating cells that are prone to chromosome missegregation.**

Susanne Hellmuth & Olaf Stemmann

Nature

Volume 585, Issue 7826, 24 September 2020

1. **Electrophysical processes are used to create third-order nanoscale circuit elements, and these are used to realize a transistorless network that can perform Boolean operations and find solutions to a computationally hard graph-partitioning problem.**
Suhas Kumar, R. Stanley Williams & Ziwen Wang
2. **Self-assembly of cubic diamond crystals is demonstrated, by using precursor clusters of particles with carefully placed ‘sticky’ patches that attract and bind adjacent clusters in specific geometries.**
Mingxin He, Johnathon P. Gales[...] & David J. Pine
3. **A wide range of side chains are installed into proteins by addition of photogenerated alkyl or difluoroalkyl radicals, providing access to new functionality and reactivity in proteins.**
Brian Josephson, Charlie Fehl[...] & Benjamin G. Davis
4. **Modelling shows that the Antarctic Ice Sheet exhibits multiple temperature thresholds beyond which ice loss would become irreversible, and once melted, the ice sheet can regain its previous mass only if the climate cools well below pre-industrial temperatures.**
Julius Garbe, Torsten Albrecht[...] & Ricarda Winkelmann
5. **A one-kilometre-resolution map of aboveground carbon accumulation rates of forest regrowth shows 100-fold variation across the globe, with rates 32% higher on average than IPCC estimates.**
Susan C. Cook-Patton, Sara M. Leavitt[...] & Bronson W. Griscom
6. **To promote the recovery of the currently declining global trends in terrestrial biodiversity, increases in both the extent of land under conservation management and the sustainability of the global food system from farm to fork are required.**
David Leclère, Michael Obersteiner[...] & Lucy Young
7. **A tight coupling between metabolic rate, efficacy of oxygen supply and the temperature sensitivities of marine animals predicts a variety of geographical niches that better aligns with the distributions of species than models of either temperature or oxygen alone.**
Curtis Deutsch, Justin L. Penn & Brad Seibel
8. **CRISPR–Cas9-mediated disruption of the endothelin-signalling pathway in the sea lamprey *Petromyzon marinus* and the frog *Xenopus laevis* were used to delineate ancient and lineage-specific roles of endothelin signalling and provide insights into vertebrate evolution.**
Tyler A. Square, David Jandzik[...] & Daniel M. Medeiros
9. **A study in *Arabidopsis thaliana* shows that the immune receptor-associated cytosolic kinase BIK1 phosphorylates OSCA1.3 and identifies OSCA1.3 as the pathogen-responsive Ca²⁺-permeable channel that regulates stomatal closure.**
Kathrin Thor, Shushu Jiang[...] & Cyril Zipfel
10. **Miniature gut tubes grown in vitro from mouse intestinal stem cells are perfusable, can be colonized with microorganisms and exhibit a similar arrangement and diversity of specialized cell types to intestines in vivo.**
Mikhail Nikolaev, Olga Mitrofanova[...] & Matthias P. Lutolf
11. **The rare blood group Dantu is known to protect against severe malaria, and a mechanism is proposed here: Dantu red blood cells have a high membrane tension that prevents invasion by malaria parasites.**
Silvia N. Kariuki, Alejandro Marin-Menendez[...] & Julian C. Rayner
12. **Hydroxychloroquine did not confer protection against SARS-CoV-2 infection or reduce the viral load after infection in macaques; these findings do not support the use of hydroxychloroquine as an antiviral drug treatment of COVID-19 in humans.**
Pauline Maisonnasse, Jérémie Guedj[...] & Roger Le Grand
13. **Expression of TMPRSS2—a protease that activates SARS-CoV-2 for entry into cells—renders SARS-CoV-2 insensitive to chloroquine.**
Markus Hoffmann, Kirstin Mösbauer[...] & Stefan Pöhlmann

14. **A liver–brain–gut neural circuit responds to the gut microenvironment and regulates the activity of peripheral regulatory T cells in the colon by controlling intestinal antigen-presenting cells in a muscarinic signalling-dependent manner.**
Toshiaki Teratani, Yohei Mikami[...] & Takanori Kanai
15. **Dysregulation of an mTORC1 substrate-specific mechanism leads to constitutive activation of TFEB, and promotes kidney cystogenesis and tumorigenesis in a mouse model of Birt–Hogg–Dubé syndrome.**
Gennaro Napolitano, Chiara Di Malta[...] & Andrea Ballabio
16. **The cellular organelles peroxisomes contribute to the sensitivity of cells to ferroptosis by synthesizing polyunsaturated ether phospholipids, and changes in the abundances of these lipids are associated with altered sensitivity to ferroptosis during cell-state transitions.**
Yilong Zou, Whitney S. Henry[...] & Stuart L. Schreiber
17. **The PARP2–HPF1 histone-modifying complex bridges two nucleosomes to align broken DNA ends for ligation, initiating conformational changes that activate PARP2 and enable DNA damage repair.**
Silvija Bilokapic, Marcin J. Suskiewicz[...] & Mario Halic
18. **The alkaloid drugs hyoscyamine and scopolamine are synthesized from sugars and amino acids in yeast, using 26 genes from yeast, plants, bacteria and animals, protein engineering and a vacuole transporter to enable functional expression of a key acyltransferase.**
Prashanth Srinivasan & Christina D. Smolke

Nature

Volume 585, Issue 7827, 1 October 2020

1. **Theoretically predicted fractional antiferromagnetic skyrmions are experimentally realized in MnSc₂S₄ and are found to originate from anisotropic couplings over nearest neighbours in the crystal lattice.**
Shang Gao, H. Diego Rosales[...] & Oksana Zaharko
2. **An ultimately thin microwave bolometric sensor based on a superconductor–graphene–superconductor Josephson junction with monolayer graphene has a sensitivity approaching the fundamental limit imposed by intrinsic thermal fluctuations.**
Gil-Ho Lee, Dmitri K. Efetov[...] & Kin Chung Fong
3. **A thermal detector based on a graphene monolayer operates at the threshold for circuit quantum electrodynamics applications, achieving a minimum time constant of 200 ns.**
R. Kokkonen, J.-P. Girard[...] & M. Möttönen
4. **Experiments and simulations show that local non-equilibrium forces exerted by self-propelled particles trapped inside a giant unilamellar lipid vesicle induce dramatic shape changes in the vesicle.**
Hanumantha Rao Vutukuri, Masoud Hoore[...] & Jan Vermant
5. **In a rotating reactor, immiscible or pairwise-immiscible liquids organize into stable but internally agitated concentric layers, enabling multistep syntheses and separations of reaction mixtures.**
Olgierd Cybulski, Mirosław Dygas[...] & Bartosz A. Grzybowski
6. **Analysis of two homologous groups of fungal pericyclases demonstrates how they can catalyse either an Alder-ene reaction—which has not previously been found in nature—or a hetero-Diels–Alder reaction.**
Masao Ohashi, Cooper S. Jamieson[...] & Yi Tang
7. **Rates of ice-mass loss from southwestern Greenland this century will exceed the maximum rate over the past 12,000 years, and would not be the result of natural variation.**
Jason P. Briner, Joshua K. Cuzzone[...] & Sophie Nowicki
8. **Analyses of the genomes of cichlid species reveal that the combination of ecological opportunity, sexual selection and exceptional genomic potential is the key to understanding explosive adaptive radiation in cichlids.**
Matthew D. McGee, Samuel R. Borstein[...] & Ole Seehausen
9. **Genome-wide analysis of tandem DNA repeats in the genomes of individuals with autism spectrum disorder and control participants reveals a strong contribution of tandem repeat expansions to the genetic aetiology and phenotypic complexity of autism spectrum disorder.**
Brett Trost, Worrawat Engchuan[...] & Ryan K. C. Yuen

10. **Dissociative states in mouse and human brains are traced to low-frequency rhythmic neural activity—with distinct molecular, cellular and physiological properties—in the deep retrosplenial cortex and the posteromedial cortex.**
Sam Vesuna, Isaac V. Kauvar[...] & Karl Deisseroth
11. **The primate amygdala contains a shared neural circuitry for eye gaze and for valence; however, this circuitry implements two different neural codes—one for the outcome and another for the expectation of the outcome.**
Raviv Pryluk, Yosef Shohat[...] & Rony Paz
12. **Single-cell transcriptomics roadmap of human dermal fibroblasts reprogrammed to primed and naive pluripotency reveals a route for the direct reprogramming of somatic cells into induced trophoblast stem cells.**
Xiaodong Liu, John F. Ouyang[...] & Jose M. Polo
13. **Phytate metabolism and production of inositol trisphosphate by commensal bacteria activates epithelial histone deacetylase 3 and promotes intestinal repair.**
Shu-en Wu, Seika Hashimoto-Hill[...] & Theresa Alenghat
14. **A screen of the ReFRAME library of approximately 12,000 known drugs for antiviral activity against severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) identified several candidate compounds with suitable activities and pharmacological profiles, which could potentially expedite the deployment of therapies for coronavirus disease 2019 (COVID-19).**
Laura Riva, Shuofeng Yuan[...] & Sumit K. Chanda
15. **Genome-wide CRISPR screens in mouse cancer cell lines are used to identify a core, conserved set of genes and pathways that govern how cancer cells evade killing by cytotoxic T lymphocytes.**
Keith A. Lawson, Cristovão M. Sousa[...] & Jason Moffat
16. **The human germinal centre response to influenza virus vaccination is fuelled by the continued recruitment of naive B cells as well as pre-existing memory B cells.**
Jackson S. Turner, Julian Q. Zhou[...] & Ali H. Ellebedy
17. **In two mouse models of intestinal cancer, mutant p53 has an oncogenic effect in the distal gut but a tumour-suppressive effect in the proximal gut, and these opposing properties are determined by the gut microbiome.**
Eliran Kadosh, Irit Snir-Alkalay[...] & Yinon Ben-Neriah
18. **Modified chromosome conformation capture (Hi-C) technology is used to characterize the interactions between sister chromatids, despite their identical DNA sequences.**
Michael Mitter, Catherina Gasser[...] & Daniel W. Gerlich
19. **Modular synthesis and structural biology are used to design and characterize group A streptogramin antibiotics, one of which has activity against streptogramin-resistant strains and demonstrates efficacy in a mouse model of bacterial infection.**
Qi Li, Jenna Pellegrino[...] & Ian B. Seiple
20. **Catalytically inactive DNMT3B3 is crucial in de novo CpG methylation of DNA, interacting with the nucleosome core to orient catalytically active DNMT3A2 so that it can bind to nearby linker DNA.**
Ting-Hai Xu, Minmin Liu[...] & Peter A. Jones

Nature

Volume 585, Issue 7828, 8 October 2020

1. **Dust-emission observations of the young (<500,000 years old) protostar IRS 63 show evidence of rings and gaps in its disk, a prerequisite of planet formation.**
Dominique M. Segura-Cox, Anika Schmiedeke[...] & Robert J. Harris
2. **Microscale magnetic devices containing nanoscale spin helices produce an inductance comparable in magnitude to that of a commercial inductor, in a volume about a million times smaller.**
Tomoyuki Yokouchi, Fumitaka Kagawa[...] & Yoshinori Tokura
3. **An air gap embedded within the structure of a thermophotovoltaic device acts as a near-perfect reflector of low-energy photons, resulting in their recovery and recycling by the thermal source, enabling excellent power-conversion efficiency.**
Dejiu Fan, Tobias Burger[...] & Stephen R. Forrest
4. **Asymmetric nickel catalysis is used to intercept transient cyclic allene intermediates to achieve stereocontrol.**
Michael M. Yamano, Andrew V. Kelleghan[...] & Neil K. Garg

5. **Bottom-up and top-down approaches are used to quantify global nitrous oxide sources and sinks resulting from both natural and anthropogenic sources, revealing a 30% increase in global human-induced emissions between 1980 and 2016.**
Hanqin Tian, Rongting Xu[...] & Yuanzhi Yao
6. **Local exposure to inequality in low-income areas is positively associated with support for a tax on wealthier individuals to address economic disparities.**
Melissa L. Sands & Daniel de Kadt
7. **Single-nucleus RNA-sequencing analyses of brain from humans, macaques, marmosets, mice and ferrets reveal diverse ways that interneuron populations have changed during evolution.**
Fenna M. Krienen, Melissa Goldman[...] & Steven A. McCarroll
8. **The supramammillary nucleus in the hypothalamus acts as a novelty hub that selectively directs different types of novelty signals to different subregions of the hippocampus and flexibly modulates the encoding of memory.**
Shuo Chen, Linmeng He[...] & Thomas J. McHugh
9. **An organoid-based screening platform maps the genetic interactions underlying intestinal development and regeneration, showing that retinoic acid metabolism maintains the balance between regeneration and homeostasis, and that an antagonist of the retinoid X receptor promotes regeneration in vivo.**
Ilya Lukonin, Denise Serra[...] & Prisca Liberali
10. **Small molecules that arise from the maternal gut microbiome in pregnant dams promote fetal thalamocortical axonogenesis in their offspring.**
Helen E. Vuong, Geoffrey N. Pronovost[...] & Elaine Y. Hsiao
11. **Na⁺ controls the function of the mitochondrial oxidative phosphorylation system and hypoxic redox signalling through an unexpected interaction with phospholipids.**
Pablo Hernansanz-Agustín, Carmen Choya-Foces[...] & Antonio Martínez-Ruiz
12. **In cells with microsatellite instability, expanded TA-dinucleotide repeats form cruciform structures that stall replication forks and cause chromosome shattering in the absence of the WRN helicase.**
Niek van Wietmarschen, Sriram Sridharan[...] & André Nussenzweig
13. **Expression of the axon-guidance gene Slit2 in endothelium, induced by endothelial sensing of tumour-derived double-stranded RNA, promotes metastatic dissemination in mouse models of breast and lung cancer.**
Bernardo Tavora, Tobias Mederer[...] & Sohail F. Tavazoie
14. **Using an auxin-inducible approach, the authors show that downmodulation of CTCF activity promotes cohesin-driven RAG endonuclease scanning, and thus V(D)J recombination, across the Igh locus.**
Zhaoping Ba, Jiangman Lou[...] & Frederick W. Alt
15. **Structural determination of the salicylic-acid-binding core of Arabidopsis NPR4 sheds light on the mechanisms through which this plant hormone interacts with its receptors, providing insights that are of potential use in engineering enhanced immunity.**
Wei Wang, John Withers[...] & Ning Zheng
16. **Structures of the acetohydroxyacid synthase complexes of Saccharomyces cerevisiae and Arabidopsis thaliana provide insights into the biosynthesis of and feedback inhibition by branched-chain amino acids.**
Thierry Lonhienne, Yu Shang Low[...] & Luke W. Guddat

Nature

Volume 586, Issue 7829, 15 October 2020

1. **Emission from atomic hydrogen at a wavelength of 21 centimetres had been observed from galaxies at a maximum redshift of 0.4, but is now reported at a redshift of about 1.**
Aditya Chowdhury, Nissim Kanekar[...] & K. S. Dwarkanath
2. **Room-temperature superconductivity is observed in a photochemically synthesized ternary carbonaceous sulfur hydride system at 15 °C and 267 GPa.**
Elliot Snider, Nathan Dasenbrock-Gammon[...] & Ranga P. Dias
3. **The concept of neuromorphic completeness and a system hierarchy for neuromorphic computing are presented, which could improve programming-language portability, hardware completeness and compilation feasibility of brain-inspired computing systems**
Youhui Zhang, Peng Qu[...] & Luping Shi

4. **Cadmium-free blue quantum dot light-emitting diodes are constructed with a quantum yield of unity, an efficiency at the theoretical limit, high brightness and long operational lifetime.**
Taehyung Kim, Kwang-Hee Kim[...] & Eunjoo Jang
5. **High oxidation resistance, without degradation of thermal or electrical conductivity, is achieved in copper using surface modification by a solvothermal or electrochemical treatment with sodium formate and formation of a thin surface coordination layer.**
Jian Peng, Bili Chen[...] & Nanfeng Zheng
6. **Modelling reveals how thick diamondiferous continental mantle 'keels' were formed only at increased mantle temperatures when the melt-depleted, hot, ductile mantle located under subducting oceanic plates flowed backwards, underplating the continents.**
L. Perchuk, T. V. Gerya[...] & W. L. Griffin
7. **Stable isotope data for Southeast Asian mammals across the Quaternary period shed light on environmental change from the Early Pleistocene to the Holocene epoch, contextualizing hominin evolution and megafauna extinction in the region.**
Julien Louys & Patrick Roberts
8. **Protein synthesis is required in distinct populations of inhibitory neurons in the mouse amygdala to store memories of danger and safety.**
Prerana Shrestha, Zhe Shan[...] & Eric Klann
9. **Stimulation of de novo protein synthesis in both excitatory and inhibitory, somatostatin-expressing neurons in the mouse hippocampus enhances memory consolidation.**
Vijendra Sharma, Rapita Sood[...] & Nahum Sonenberg
10. **Microglia, the brain's immune cells, suppress neuronal activity in response to synaptic ATP release and alter behavioural responses in mice.**
Ana Badimon, Hayley J. Strasburger[...] & Anne Schaefer
11. **Ruhugu virus and rustrela virus are the first close relatives of rubella virus, providing insights into the zoonotic origin of rubella virus and the epidemiology and evolution of all three viruses.**
Andrew J. Bennett, Adrian C. Paskey[...] & Tony L. Goldberg
12. **Structures of prokaryotic homologues of STING permit the reconstruction of the evolutionary trajectory of its incorporation into metazoan innate immunity, and reveal a role for the conserved cGAS–STING pathway in prokaryotic defence against bacteriophages.**
Benjamin R. Morehouse, Apurva A. Govande[...] & Philip J. Kranzusch
13. **The dynamic and reversible S-palmitoylation of the transcription factor STAT3 enhances its activation and promotes the differentiation of TH17 cells.**
Mingming Zhang, Lixing Zhou[...] & Hening Lin
14. **The chromatin protein MeCP2 is a component of dynamic, liquid-like heterochromatin condensates, and the ability of MeCP2 to form condensates is disrupted by mutations in the MECP2 gene that occur in the neurodevelopmental disorder Rett syndrome.**
Charles H. Li, Eliot L. Coffey[...] & Richard A. Young
15. **Exposing Caenorhabditis elegans to non-coding small RNAs from pathogenic Pseudomonas aeruginosa induces avoidance behaviours in treated worms and their progeny, which reveals how C. elegans discriminates between bacterial species in its microbial environment.**
Rachel Kaletsky, Rebecca S. Moore[...] & Coleen T. Murphy
16. **Structural studies of the dimerization quality control E3 ubiquitin ligase SCF–FBXL17 indicate that its selectivity for aberrant complex formation is based on recognizing both shape and complementarity of interacting domains.**
Elijah L. Mena, Predrag Jevtić[...] & Michael Rape
17. **Structure of the K⁺ channel TASK2 and how this channel opens in response to pH changes on either side of the cell membrane.**
Baobin Li, Robert A. Rietmeijer & Stephen G. Brohawn
18. **Transparency and reproducibility in artificial intelligence**
Benjamin Haibe-Kains, George Alexandru Adam[...] & Hugo J. W. L. Aerts

1. **The architecture of planetary systems is shown to be strongly affected by stellar clustering in position-velocity phase space; hot Jupiters occur preferentially at high density, suggesting that their extreme orbits originate from environmental perturbations.**
Andrew J. Winter, J. M. Diederik Kruijssen[...] & Mélanie Cheavance
2. **Scalable optics co-fabricated with a cryogenic surface-electrode ion trap are used to drive high-fidelity multi-ion quantum logic gates, demonstrating a route to simultaneously scale and reduce errors in quantum processors.**
Karan K. Mehta, Chi Zhang[...] & Jonathan P. Home
3. **A surface-electrode ion-trap chip is demonstrated, which delivers all the wavelengths of light required for the preparation and operation of ion qubits.**
R. J. Niffenegger, J. Stuart[...] & J. Chiaverini
4. **A jigsaw-style configuration of interlocking structures identified in the elytra of the remarkably tough diabolical ironclad beetle, *Phloeodes diabolicus*, is used to inspire crush-resistant multilayer composites for engineering joints.**
Jesus Rivera, Maryam Sadat Hosseini[...] & David Kisailus
5. **Investigation of a chromium-based metal–organic framework shows that the location of added TiO₂ inside specific mesopores strongly affects the ability of the material to catalyse photoreduction of CO₂.**
Zhuo Jiang, Xiaohui Xu[...] & Hexiang Deng
6. **Analysis of global three-dimensional shear attenuation and velocity models implies that partial melting in the seismic low-velocity zone enables motion of oceanic plates by reducing the viscosity of the asthenosphere.**
Eric Debayle, Thomas Bodin[...] & Yanick Ricard
7. **A model in mouse using a species-adapted virus recapitulates features of SARS-CoV-2 infection and age-related disease pathogenesis in humans, and provides a model system for rapid evaluation of medical countermeasures against coronavirus disease 2019 (COVID-19).**
Kenneth H. Dinno III, Sarah R. Leist[...] & Ralph S. Baric
8. **mRNA-1273, an mRNA vaccine that encodes a stabilized prefusion-state severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) spike protein, elicits robust immune responses and protects mice against replication of SARS-CoV-2 in the upper and lower airways.**
Kizzmekia S. Corbett, Darin K. Edwards[...] & Barney S. Graham
9. **A recombinant vaccine that targets the receptor-binding domain of the spike protein of SARS-CoV-2 induces a potent antibody response in immunized mice, rabbits and non-human primates, and protects primates from infection with the virus.**
Jingyun Yang, Wei Wang[...] & Xiawei Wei
10. **The ChAdOx1 nCoV-19 vaccine against SARS-CoV-2 induces an immune response in rhesus macaques and leads to reduced SARS-CoV-2 viral loads in respiratory tissues and an absence of pneumonia, but not to a reduction in nasal virus shedding, compared with unvaccinated animals.**
Neeltje van Doremalen, Teresa Lamb[...] & Vincent J. Munster
11. **The protective efficacy of a single dose of adenovirus serotype 26 (Ad26) vector-based vaccine expressing the SARS-CoV-2 spike protein in non-human primates is demonstrated.**
Noe B. Mercado, Roland Zahn[...] & Dan H. Barouch
12. **In a dose-escalation study of the COVID-19 RNA vaccine BNT162b1 in 45 healthy adults, RBD-binding IgG concentrations and SARS-CoV-2 neutralizing titres in sera increased with dose level and after a second vaccine dose.**
Mark J. Mulligan, Kirsten E. Lyke[...] & Kathrin U. Jansen
13. **In a phase I/II dose-escalation clinical trial, the mRNA COVID-19 vaccine BNT162b1 elicits specific T cell and antibody responses that suggest it has protective potential.**
Ugur Sahin, Alexander Muik[...] & Özlem Türeci
14. **A combination of clonal expansion and DNA amplification is used to sequence genetic material from individual melanocytes, shedding light on the mutational landscape of these cells and the development of melanomas.**
Jessica Tang, Eleanor Fewings[...] & A. Hunter Shain
15. **Metabolically-mature human islet-like organoids generated from induced pluripotent stem cells are able to recapitulate insulin-responsive pancreatic islet function and avoid immunologic cell death in diabetic mouse transplantation models.**

- Eiji Yoshihara, Carolyn O'Connor[...] & Ronald M. Evans
16. **Single-cell RNA-sequencing analysis of embryogenesis and X chromosome inactivation in the opossum (*Monodelphis domestica*) resolves the developmental trajectory of a marsupial, and sheds light on the evolution of embryogenesis in mammals.**
Shantha K. Mahadevaiah, Mahesh N. Sangrithi[...] & James M. A. Turner
 17. **Reconstitution of the activation of the MLH1–MLH3 endonuclease shows how crossovers are formed during meiosis.**
Elda Cannavo, Aurore Sanchez[...] & Petr Cejka
 18. **A new mechanism explaining how double Holliday junctions are specifically resolved into crossovers during meiosis is shown that resembles the initiation of DNA mismatch repair.**
Dhananjaya S. Kulkarni, Shannon N. Owens[...] & Neil Hunter

Nature

Volume 586, Issue 7831, 29 October 2020

1. **Polarization observations of the fast radio burst FRB 180301 with the FAST radio telescope show diverse polarization angle swings, consistent with a magnetospheric origin of the emission.**
R. Luo, B. J. Wang[...] & Y. Zhu
2. **When the Philae lander bounced on the surface of comet 67P/Churyumov–Gerasimenko, it exposed primitive icy-dust material within cometary boulders; the intrinsic strength and porosity of this material is reported.**
Laurence O'Rourke, Philip Heinisch[...] & Holger Sierks
3. **High-throughput calculations are performed to predict approximately 130 magnetic topological materials, with complete electronic structure calculations and topological phase diagrams.**
Yuanfeng Xu, Luis Elcoro[...] & B. Andrei Bernevig
4. **A combination of spectroscopy, microscopy and theoretical calculations shows that the reactivity of titanium silicalite-1 as an epoxidation catalyst is due to the presence of dinuclear titanium sites.**
Christopher P. Gordon, Hauke Engler[...] & Christophe Copéret
5. **Metal-free borylation of C(sp³)–H bonds by violet-light-induced hydrogen atom transfer is reported, demonstrating high selectivity for the substitution of methyl C–H bonds over other weaker C–H bonds.**
Chao Shu, Adam Noble & Varinder K. Aggarwal
6. **Newly available atmospheric carbon dioxide measurements from six sites across China during 2009 to 2016 indicate a larger land carbon sink than previously thought, reflecting increased afforestation.**
Jing Wang, Liang Feng[...] & ChaoZong Xia
7. **Multicriteria optimization identifies global priority areas for ecosystem restoration and estimates their benefits for biodiversity and climate, providing cost–benefit analyses that highlight the importance of optimizing spatial planning and incorporating several biomes in restoration strategies.**
Bernardo B. N. Strassburg, Alvaro Iribarrem[...] & Piero Visconti
8. **Persistent neural activity in the mouse hypothalamus encodes aversive emotional states related to specific threatening stimuli.**
Ann Kennedy, Prabhat S. Kunwar[...] & David J. Anderson
9. **The IFITM3 innate immunity protein directly binds presenilin near the active site and upregulates γ -secretase activity and the production of amyloid- β , and IFITM3 is upregulated in patients with late-onset Alzheimer's disease.**
Ji-Yeun Hur, Georgia R. Frost[...] & Yue-Ming Li
10. **Whole-genome sequencing analyses of African populations provide insights into continental migration, gene flow and the response to human disease, highlighting the importance of including diverse populations in genomic analyses to understand human ancestry and improve health.**
Ananyo Choudhury, Shaun Aron[...] & Neil A. Hanchard
11. **Exome sequences from the first 49,960 participants in the UK Biobank highlight the promise of genome sequencing in large population-based studies and are now accessible to the scientific community.**
Cristopher V. Van Hout, Ioanna Tachmazidou[...] & Aris Baras

12. **By integrating healthcare and exome-sequencing data from parent–offspring trios of patients with developmental disorders, 28 genes that had not previously been associated with developmental disorders were identified.**
Joanna Kaplanis, Kaitlin E. Samocha[...] & Kyle Retterer
13. **Analysis of 97,691 high-coverage human blood DNA-derived whole-genome sequences enabled simultaneous identification of germline and somatic mutations that predispose individuals to clonal expansion of haematopoietic stem cells, indicating that both inherited and acquired mutations are linked to age-related cancers and coronary heart disease.**
Alexander G. Bick, Joshua S. Weinstock[...] & Pradeep Natarajan
14. **A genome-wide association study identifies 17 genetic loci that are associated with the risk of myeloproliferative neoplasms (MPNs), and shows that the modulation of haematopoietic stem cell function drives MPN risk.**
Erik L. Bao, Satish K. Nandakumar[...] & Vijay G. Sankaran
15. **Two out of 15 dogs from households with confirmed human cases of COVID-19 were asymptotically infected with SARS-CoV-2 and showed antibody responses to the virus.**
Thomas H. C. Sit, Christopher J. Brackman[...] & Malik Peiris
16. **A approach termed ‘receptor inhibition by phosphatase recruitment’ is described for attenuating both tonic and ligand-activated cell-surface receptor signalling.**
Ricardo A. Fernandes, Leon Su[...] & K. Christopher Garcia
17. **Single-cell analysis of blood vessels in the alveolus, the site of chronic disease and virus-induced lung injury, reveals two intermingled endothelial cell types with specialized gas exchange and stem cell functions.**
Astrid Gillich, Fan Zhang[...] & Ross J. Metzger
18. **In xenograft tumour models in mice, modulation of dietary serine, serine palmitoyltransferase or phosphoglycerate dehydrogenase activity enables control of the endogenous synthesis of deoxysphingolipids, sensitizing the tumours to metabolic stress and slowing their progression.**
Thangaselvam Muthusamy, Thekla Cordes[...] & Christian M. Metallo
19. **In-cell structural studies in *Saccharomyces cerevisiae* reveal that the configuration of the Nup159 complex is a key determinant of the mRNA export function of the nuclear pore complex, and suggest a model in which nuclear pore complexes are degraded via the autophagy machinery.**
Matteo Allegretti, Christian E. Zimmerli[...] & Martin Beck
20. **Cryo-electron microscopy structures of the bacterial recombination protein RecA with DNA, and of RecA–D-loop complexes, provide insights into the double-stranded DNA opening, homology search and strand-exchange processes of homologous recombination.**
Haijuan Yang, Chun Zhou[...] & Nikola P. Pavletich
21. **Structures of the iron transporter ferroportin and the peptide hormone hepcidin suggest how iron homeostasis is tightly regulated.**
Christian B. Billesbølle, Caleigh M. Azumaya[...] & Aashish Manglik

Nature

Volume 587, Issue 7832, 5 November 2020

1. **Measurements of an intense radio burst from a Galactic magnetar provide evidence that magnetars are the probable source of some fast radio bursts.**
B. C. Andersen, K. M. Bandura[...] & A. V. Zwaniga
2. **Observations of the fast radio burst FRB 200428 coinciding with X-rays from the Galactic magnetar SGR 1935+2154 indicate that active magnetars can produce fast radio bursts at extragalactic distances.**
C. D. Bochenek, V. Ravi[...] & D. L. McKenna
3. **An 8-hour radio observational campaign of the Galactic magnetar SGR 1935+2154, assisted by multi-wavelength data, indicates that associations between fast radio bursts and soft γ -ray bursts are rare.**
L. Lin, C. F. Zhang[...] & J.-H. Zou
4. **A mechanistic explanation for the origin of the neutron dripline shows that nuclei accommodate the addition of neutrons by becoming increasingly ellipsoidal, up to a maximum number of neutrons, reconciling theory and experiments.**
Naofumi Tsunoda, Takaharu Otsuka[...] & Hideki Ueno

5. **Logic operations and reconfigurable circuits are demonstrated that can be directly implemented using memory elements based on floating-gate field-effect transistors with monolayer MoS₂ as the active channel material.**
Guilherme Migliato Marega, Yanfei Zhao[...] & Andras Kis
6. **Deep learning was used to map the crown sizes of each tree in the West African Sahara, Sahel and sub-humid zone using submetre-resolution satellite imagery, revealing a relatively high density of trees in arid areas.**
Martin Brandt, Compton J. Tucker[...] & Rasmus Fensholt
7. **Phylogenetic statistical analyses, biophysical models and information from the fossil record show that an evolutionary signal of natural selection acted to increase the flight efficiency of pterosaurs over millions of years.**
Chris Venditti, Joanna Baker[...] & Stuart Humphries
8. **Lapses in attention before remembering partially account for why we remember or forget in the moment, why some individuals remember better than others, and why heavier media multitasking is related to worse memory.**
Kevin P. Madore, Anna M. Khazenzon[...] & Anthony D. Wagner
9. **Dimethoxy-1,4-benzoquinone signalling occurs in Arabidopsis and in the root parasite Phtheirospermum japonicum via increases in cytosolic Ca²⁺ concentration mediated by the leucine-rich-repeat receptor-like kinase CARD1 in Arabidopsis, or by its homologues in P. japonicum.**
Anuphon Laohavisit, Takanori Wakatake[...] & Ken Shirasu
10. **Single-nucleus RNA sequencing in mouse and human adipose tissue identifies a subpopulation of adipocytes that regulates thermogenesis in neighbouring adipocytes in a paracrine manner by modulating acetate signalling.**
Wenfei Sun, Hua Dong[...] & Christian Wolfrum
11. **Experiments using an ecologically realistic 185-member bacterial synthetic community in the root system of Arabidopsis reveal that Variovorax bacteria can influence plant hormone levels to reverse the inhibitory effect of the community on root growth.**
Omri M. Finkel, Isai Salas-González[...] & Jeffery L. Dangl
12. **Human cytomegalovirus rotates the nuclei of infected cells to set up intranuclear polarization and thereby separate viral DNA from inactive histones and associated host DNA.**
Dean J. Procter, Colleen Furey[...] & Derek Walsh
13. **Depletion of transforming growth factor- β receptor 2 (TGFBR2) in CD4⁺ T cells results in IL-4-dependent vascular remodelling, stopping tumour growth in a transgenic mouse model of breast cancer, suggesting that type 2 immunity could be targeted for cancer treatments.**
Ming Liu, Fengshen Kuo[...] & Ming O. Li
14. **4T-Trap, a bispecific molecule designed to recognize CD4 and bind TGF- β , blocks TGF- β signalling in T helper cells, causing interleukin-4-dependent vascular reorganization and cancer cell death in a mouse model of breast cancer.**
Shun Li, Ming Liu[...] & Ming O. Li
15. **Chromosomal instability enables the continuous selection of somatic copy number alterations, which are established as ordered events that often occur in parallel, throughout tumour evolution and metastasis.**
Thomas B. K. Watkins, Emilia L. Lim[...] & Charles Swanton
16. **The adaptor protein TRADD is a regulator of both cellular homeostasis and apoptosis, and represents a potential therapeutic target for human diseases.**
Daichao Xu, Heng Zhao[...] & Junying Yuan
17. **Binding of RNA polymerase II during zygotic genome activation in mouse embryos is determined using the newly developed method Stacc-seq.**
Bofeng Liu, Qianhua Xu[...] & Wei Xie
18. **A protein condensate formed by multivalent interactions between the long non-coding RNA Xist and specific RNA-binding proteins drives the compartmentalization required to perpetuate gene silencing on the inactive X chromosome.**
Amy Pandya-Jones, Yolanda Markaki[...] & Kathrin Plath
19. **Advances in electron cryo-microscopy hardware allow proteins to be studied at atomic resolution.**
Takanori Nakane, Abhay Kotecha[...] & Sjors H. W. Scheres

20. **Advances in electron cryo-microscopy allow the structure of apoferritin to be determined at a resolution that enables the visualization of individual atoms.**
Ka Man Yip, Niels Fischer[...] & Holger Stark

Nature

Volume 587, Issue 7833, 12 November 2020

1. **Analysis of the size and depth of craters on boulders on the asteroid (101955) Bennu indicates that Bennu has been in near-Earth space for 1.75 ± 0.75 million years.**
R.-L. Ballouz, K. J. Walsh[...] & D. S. Lauretta
2. **High-precision cross-sections of the nuclear reaction that burns deuterium to create helium-3 are used to produce theoretical estimates of the primordial baryon density that are in agreement with recent astronomical observations.**
V. Mossa, K. Stöckel[...] & S. Zavatarelli
3. **An optical sensing technique reveals an abundance of correlated insulating states at fractional fillings of moiré superlattices that are proposed to arise from a series of charge-ordered states.**
Yang Xu, Song Liu[...] & Jie Shan
4. **Strain gauges with both high sensitivity and high mechanical resilience, based on strain-mediated contact in anisotropically resistive structures, are demonstrated within a sensor-integrated, textile-based sleeve that can recognize human hand motions via muscle deformations.**
Oluwaseun A. Araromi, Moritz A. Graule[...] & Robert J. Wood
5. **The onset of rigidity in a two-dimensional colloidal glass-forming system is identified by the formation and merging of locally rigid domains in which particles move in a cooperative manner.**
Bo Li, Kai Lou[...] & Steve Granick
6. **North Atlantic landfalling hurricanes are weakening more slowly than in the past because warming oceans are increasing the moisture carried by the storm until it hits land, and this storm moisture acts as an ongoing heat source post-landfall.**
Lin Li & Pinaki Chakraborty
7. **A robotic pipeline is used to survey a library of mutations in a Drosophila gene enhancer, showing that most mutations altered gene expression and had widespread pleiotropic effects that are likely to constrain regulatory evolution.**
Timothy Fuqua, Jeff Jordan[...] & Justin Crocker
8. **The Progressive Cactus program can create reference-free alignments of hundreds of large vertebrate genomes efficiently, and is used for the alignment of more than 600 amniote genomes.**
Joel Armstrong, Glenn Hickey[...] & Benedict Paten
9. **A dataset of the genomes of 363 species from the Bird 10,000 Genomes Project shows increased power to detect shared and lineage-specific variation, demonstrating the importance of phylogenetically diverse taxon sampling in whole-genome sequencing.**
Shaohong Feng, Josefin Stiller[...] & Guojie Zhang
10. **Two populations of neurons with distinct anatomy and receptor expression that convey information from the spinal cord to the brain have different functional properties with respect to touch and pain.**
Seungwon Choi, Junichi Hachisuka[...] & David D. Ginty
11. **Social memory is consolidated in the brain through the reactivation of neuronal firing by sharp-wave ripples in the CA2 region of the hippocampus, in a similar way to the consolidation of spatial memory.**
Azahara Oliva, Antonio Fernández-Ruiz[...] & Steven A. Siegelbaum
12. **A study of patients with COVID-19 and healthy donors found CD4+ T cells that react to the spike protein of SARS-CoV-2 and human endemic coronaviruses; however, the effect of pre-existing SARS-CoV-2 cross-reactive T cells on clinical outcomes remains to be determined.**
Julian Braun, Lucie Loyal[...] & Andreas Thiel
13. **NEDD4-binding protein 1 (N4BP1) is identified as a suppressor of cytokine production that is inactivated by caspase-8, which provides insight into the mechanisms underlying the immunodeficiency caused by mutations in FADD and caspase-8.**
Alexander D. Gitlin, Klaus Heger[...] & Vishva M. Dixit

14. **Genomic integration of an adeno-associated virus vector in a mouse model of Angelman syndrome unsilences paternal Ube3a and rescues anatomical and behavioural phenotypes, suggesting a pathway towards the treatment of this neurodevelopmental disorder.**
Justin M. Wolter, Hanqian Mao[...] & Mark J. Zylka
15. **The surfactant-like protein Ki-67 mediates the clustering of chromosomes during mitotic exit, which displaces large cytoplasmic molecules from the future nuclear space and thus enables the separation of cytoplasmic and nuclear components before the nuclear envelope reforms.**
Sara Cuylen-Haering, Mina Petrovic[...] & Daniel W. Gerlich
16. **A high-throughput assay that introduces mismatched base pairs into the DNA sequence shows that mismatches can increase transcription factor binding affinity by prepaying some of the energetic cost of distorting the DNA.**
Ariel Afek, Honglue Shi[...] & Raluca Gordân
17. **Mother cells recycle parental MCMs and simultaneously synthesize nascent MCMs, both of which are inherited by daughter cells, in which the former are preferentially used to form active replisomes and the latter adjust the pace of replisome movement to minimize errors during DNA replication.**
Hana Sedlackova, Maj-Britt Rask[...] & Jiri Lukas
18. **Telomeric-repeat-containing RNA is recruited to telomeres by a mechanism that involves the DNA recombinase RAD51 and the formation of DNA–RNA hybrids, or R-loops—a process similar to that involved in homology-directed DNA repair.**
Marianna Feretzaki, Michaela Pospisilova[...] & Joachim Lingner
19. **The structure of a RIFIN–LILRB1 complex reveals that a subset of RIFINs of Plasmodium falciparum mimics the binding mode of the natural ligand of human LILRB1 and suppress the function of natural killer cells in humans.**
Thomas E. Harrison, Alexander M. Mørch[...] & Matthew K. Higgins
20. **Structural and functional studies of the sodium leak channel, non-selective (NALCN) in complex with a distinct auxiliary subunit reveal the structural basis of the channel function and pharmacology and the functional impact of mutations that cause NALCN channelopathies.**
Marc Kschonsak, Han Chow Chua[...] & Jian Payandeh

Nature

Volume 587, Issue 7834, 19 November 2020

1. **Observations and stellar evolution models of a blue ring nebula and its central star (TYC 2597-735-1) suggest that the remnant star merged with a lower-mass companion several thousand years ago.**
Keri Hoadley, D. Christopher Martin[...] & Bradley E. Schaefer
2. **Quantum simulation in a 71-site optical lattice certifies gauge invariance, showing how this essential property of lattice gauge theories can be maintained across a quantum phase transition.**
Bing Yang, Hui Sun[...] & Jian-Wei Pan
3. **A theoretical model in the form of a stochastic differential equation is proposed that describes, more accurately than previous models, the population evolution of cities, revealing that rare but very large interurban migration is a dominant factor.**
Vincent Verbavatz & Marc Barthelemy
4. **A model shows that human mobility is organized within hierarchical containers that coincide with familiar scales and that a power-law distribution emerges when movements between different containers are combined.**
Laura Alessandretti, Ulf Aslak & Sune Lehmann
5. **Spectroscopic studies and theoretical calculations of the electrocatalytic oxygen evolution reaction establish that reaction rates depend on the amount of charge stored in the electrocatalyst, and not on the applied potential.**
Hong Nhan Nong, Lorenz J. Falling[...] & Travis E. Jones
6. **Observations and air-quality modelling reveal that the sources of particulate matter and oxidative potential in Europe are different, implying that reducing mass concentrations of particulate matter alone may not reduce oxidative potential.**
Kaspar R. Daellenbach, Gaëlle Uzu[...] & André S. H. Prévôt

7. **A yeast clonal descendant of an ancient hybridization event is identified and sheds light on the early evolution of the *Saccharomyces cerevisiae* Alpechin lineage and its abundant *Saccharomyces paradoxus* introgressions.**
Melania D'Angiolo, Matteo De Chiara[...] & Gianni Liti
8. **The onset of maternal behaviour in mice involves an interaction between intrinsic tuning of auditory cortical neurons and experience-dependent plasticity.**
Jennifer K. Schiavo, Silvana Valtcheva[...] & Robert C. Froemke
9. **Timing and position of spontaneously arising waves of activity in the visual cortex predict the sensitivity of visual perception in awake, behaving marmosets (*Callithrix jacchus*).**
Zachary W. Davis, Lyle Muller[...] & John H. Reynolds
10. **The authors identify long-lasting transcriptional programmes in neurons and glia that are associated with the storage of a remote memory.**
Michelle B. Chen, Xian Jiang[...] & Thomas C. Südhof
11. **Comparative analysis of human, cow and mouse embryos shows that a mechanism involving atypical protein kinase C initiates the trophoctoderm program during the morula stage in these three species.**
Claudia Gerri, Afshan McCarthy[...] & Kathy K. Niakan
12. **The authors use a machine-learning approach to uncover confounding variables in studies that seek to establish an association between the gut microbiota and human disease.**
Ivan Vujkovic-Cvijin, Jack Sklar[...] & Yasmine Belkaid
13. **A multi-organ circuit is activated in female flies after mating, leading to changes in enteric neurons that increase food intake.**
Dafni Hadjieconomou, George King[...] & Irene Miguel-Aliaga
14. **Heart atria produce a large pool of calcitonin (previously well-recognized as a thyroid-secreted hormone with roles in calcium and bone metabolism) that in the heart acts as a paracrine signal controlling atrial fibrosis and fibrillation.**
Lucia M. Moreira, Abhijit Takawale[...] & Svetlana Reilly
15. **Viral infection of the respiratory system induces exuberant fibroblast activity, resulting in extensive remodelling of the extracellular matrix and cytokine release, which promote immune cell infiltration of the affected area at the expense of respiratory function.**
David F. Boyd, E. Kaitlynn Allen[...] & Paul G. Thomas
16. **IgA-secreting plasma cells that originate in the intestine are found in the meninges, where they protect the brain against pathogens.**
Zachary Fitzpatrick, Gordon Frazer[...] & Menna R. Clatworthy
17. **The evolution of myeloid malignancies is investigated using combined single-cell sequencing and immunophenotypic analysis.**
Linde A. Miles, Robert L. Bowman[...] & Ross L. Levine
18. **The molecular steps that lead to the disaggregation of amyloid fibrils are shown to involve the synergistic action of HSP70 and its co-chaperones DNAJB1 and HSP110.**
Anne S. Wentink, Nadinath B. Nillegoda[...] & Bernd Bukau
19. **The binding and activation of HSP70 by class B J-domain proteins is subject to an autoinhibitory regulatory mechanism that controls substrate targeting to HSP70 and is required for the disaggregation of amyloid fibres.**
Ofrah Faust, Meital Abayev-Avraham[...] & Rina Rosenzweig
20. **Structures of the assembled matrix protein 1 of influenza A virus in intact virus particles and of oligomers of this protein reconstituted in vitro reveal mechanisms of assembly and disassembly of influenza virus.**
Julia Peukes, Xiaoli Xiong[...] & John A. G. Briggs
21. **Using cryo-electron microscopy, the authors report the structures of G-protein-coupled bile acid receptor–Gs complexes and reveal the structural basis of bile acid recognition.**
Fan Yang, Chunyou Mao[...] & Yan Zhang

Nature

Volume 587, Issue 7835, 26 November 2020

1. **Direct experimental evidence of the carbon–nitrogen–oxygen fusion cycle in the Sun is provided by the detection of neutrinos emitted during this process.**
M. Agostini, K. Altenmüller[...] & G. Zuzel
2. **An atomic simulator formed of a few ultracold fermionic atoms trapped in a two-dimensional harmonic potential exhibits precursors of a quantum phase transition, revealing the onset of collective quantum many-body phenomena in a few-body system.**

- Luca Bayha, Marvin Holten[...] & Selim Jochim
3. **Lateral-flow in vitro diagnostic assays based on fluorescent nanodiamonds, in which microwave-based spin manipulation is used to increase sensitivity, are demonstrated using the biotin–avidin model and by the single-copy detection of HIV-1 RNA.**
Benjamin S. Miller, Léonard Bezing[...] & Rachel A. McKendry
 4. **Optically dark (non-emitting) triplet excitons on organic molecules may be rendered bright by coupling the molecules to lanthanide-doped nanoparticles, providing a way to control such excitons in optoelectronic systems.**
Sanyang Han, Renren Deng[...] & Akshay Rao
 5. **Changes in Northern Hemisphere ice-sheet size during ice-age cycles enhance the advance and retreat of the grounding line of the Antarctic Ice Sheet, owing to interhemispheric sea-level forcing.**
Natalya Gomez, Michael E. Weber[...] & Holly K. Han
 6. **Human-generated noise and night lighting affect breeding habits and fitness in birds, implying that sensory pollutants must be considered alongside other environmental factors in assessing biodiversity conservation.**
Masayuki Senzaki, Jesse R. Barber[...] & Clinton D. Francis
 7. **Risk of severe COVID-19 is conferred by a genomic segment that is inherited from Neanderthals and is carried by around 50% and 16% of people in south Asia and Europe, respectively.**
Hugo Zeberg & Svante Pääbo
 8. **In neonatal mice, scar-free healing after spinal cord injury is organized by microglia, and transplantation of neonatal microglia or peptidase-inhibitor-treated adult microglia into adult mice after injury improves healing and axon regrowth.**
Yi Li, Xuelian He[...] & Zhigang He
 9. **Expression profiling on 75,000 single cells creates a comprehensive cell atlas of the human lung that includes 41 out of 45 previously known cell types and 14 new ones.**
Kyle J. Travaglini, Ahmad N. Nabhan[...] & Mark A. Krasnow
 10. **Mouse models of muscle injuries and ageing characterized by low levels of intra-tissue glutamine are ameliorated by macrophage-specific deletion or systemic pharmacological inhibition of glutamate dehydrogenase 1, which results in constitutively high activity of glutamine synthetase.**
Min Shang, Federica Cappellesso[...] & Massimiliano Mazzone
 11. **Argonaute protein from the bacterium *C. butyricum* targets multicopy genetic elements and functions in the suppression of plasmid and phage propagation, and there appears to be a DNA-mediated immunity pathway in prokaryotes.**
Anton Kuzmenko, Anastasiya Oguienko[...] & Andrey Kulbachinskiy
 12. **Structural and biochemical studies of influenza virus RNA polymerase in complex with host acidic nuclear phosphoprotein 32 (ANP32) show how ANP32-mediated polymerase dimerization enables the replication of influenza viral RNA in a host-dependent manner.**
Loïc Carrique, Haitian Fan[...] & Jonathan M. Grimes
 13. **Analysis of cis-regulatory chromatin interactions, open chromatin and transcriptomes for different cell types isolated from mid-gestational human cortex samples provides insights into gene regulation during development.**
Michael Song, Mark-Phillip Pebworth[...] & Yin Shen
 14. **Transcriptomics, proteomics, single-cell RNA sequencing, population-wide genetic association studies and structure–function analyses provide a picture of how the differential expression of G-protein-coupled receptor isoforms can diversify signalling in different tissues.**
Maria Marti-Solano, Stephanie E. Crilly[...] & M. Madan Babu
 15. **Biochemical, structural and functional studies on the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) papain-like protease PLpro reveal that it regulates host antiviral responses by preferentially cleaving the ubiquitin-like interferon-stimulated gene 15 protein (ISG15) and identify this protease as a potential therapeutic target for coronavirus disease 2019 (COVID-19).**
Donghyuk Shin, Rukmini Mukherjee[...] & Ivan Dikic
 16. **A methyltransferase ribozyme, along with the small-molecule cofactor O6-methylguanine, is shown to catalyse the site-specific installation of 1-methyladenosine in various RNAs, providing insights into the catalytic abilities of RNA.**
Carolin P. M. Scheitl, Mohammad Ghaem Maghami[...] & Claudia Höbartner

17. **Using cryo-electron microscopy, the authors determine the structure of cGAS bound to nucleosomes and present evidence for the mechanism by which nucleosome binding to cGAS prevents cGAS dimerization and its binding to free double-stranded DNA.**
Ganesh R. Pathare, Alexiane Decout[...] & Andrea Ablasser
18. **Structural studies show that cyclic GMP–AMP synthase binds to nucleosomes through its DNA-binding site, which maintains it in an inactive conformation and prevents self-DNA binding.**
Baoyu Zhao, Pengbiao Xu[...] & Pingwei Li
19. **Biochemical and structural analyses show how tethering of the nucleotidyltransferase cGAS to chromatin prevents autoimmune recognition of nuclear DNA.**
Sebastian Michalski, Carina C. de Oliveira Mann[...] & Karl-Peter Hopfner
20. **Studies of five cryo-electron microscopy structures reveal the composition and conformational progression in the final maturation events of human 40S ribosomal subunit assembly.**
Michael Ameismeier, Ivo Zemp[...] & Roland Beckman

Nature

Volume 588, Issue 7836, 3 December 2020

1. **The triple- α reaction rate in proton-rich core-collapse supernovae is found to be enhanced at high nucleon densities, suppressing the formation of proton-rich nuclei from gallium to cadmium.**
Shilun Jin, Luke F. Roberts[...] & Hendrik Schatz
2. **The fine-structure constant is determined with an accuracy of 81 parts per trillion using matter-wave interferometry to measure the rubidium atom recoil velocity.**
Léo Morel, Zhibin Yao[...] & Saïda Guellati-Khélifa
3. **Non-volatile electrical switching of magnetic order in an orbital Chern insulator is experimentally demonstrated using a moiré heterostructure and analysis shows that the effect is driven by topological edge states.**
H. Polshyn, J. Zhu[...] & A. F. Young
4. **Electronic ferroelectricity is observed in a graphene-based moiré heterostructure, which is explained using a spontaneous interlayer charge-transfer model driven by layer-specific on-site Coulomb repulsion.**
Zhiren Zheng, Qiong Ma[...] & Pablo Jarillo-Herrero
5. **Data augmentation and a self-correcting design are used to develop a reinforcement-learning algorithm for the autonomous navigation of Loon superpressure balloons in challenging stratospheric weather conditions.**
Marc G. Bellemare, Salvatore Candido[...] & Ziyu Wang
6. **A synthetic route-planning algorithm, augmented with causal relationships that allow it to strategize over multiple steps, can design complex natural-product syntheses that are indistinguishable from those designed by human experts.**
Barbara Mikulak-Klucznik, Patrycja Gołębiowska[...] & Bartosz A. Grzybowski
7. **A model is proposed for the origin of cratonic lithospheric mantle in which rifting and melting in the hot, early Earth mantle leave behind large volumes of stiffer, depleted mantle.**
Fabio A. Capitanio, Oliver Nebel & Peter A. Cawood
8. **Modelled supply curves show that, with policy reform and technological innovation, the production of food from the sea may increase sustainably, perhaps supplying 25% of the increase in demand for meat products by 2050.**
Christopher Costello, Ling Cao[...] & Jane Lubchenco
9. **Kylinxia zhangii is a transitional fossil that is an evolutionary ‘missing link’ between radiodonts (also known as anomalocaridids) and true arthropods, providing insights into the origin and early evolution of Arthropoda.**
Han Zeng, Fangchen Zhao[...] & Diying Huang
10. **Population genomic analyses of Midas cichlid fishes in young Nicaraguan crater lakes suggest that sympatric speciation is promoted by polygenic architectures.**
Andreas F. Kautt, Claudius F. Kratochwil[...] & Axel Meyer
11. **The authors uncover the diverse transcriptomic cell types of thirst-driving neurons in the lamina terminalis and show that unique combinations of neuron types respond to and mediate distinct thirst states.**
Allan-Hermann Pool, Tongtong Wang[...] & Yuki Oka

12. **By collecting nearly 50,000 perceptual estimates of smell, a reliable physicochemical measure that links odorant structure to odorant perception at a resolution that enables the creation of olfactory metamers was derived.**
Aharon Ravia, Kobi Snitz[...] & Noam Sobel
13. **Expression of three Yamanaka transcription factors in mouse retinal ganglion cells restores youthful DNA methylation patterns, promotes axon regeneration after injury, and reverses vision loss in a mouse model of glaucoma and in aged mice, suggesting that mammalian tissues retain a record of youthful epigenetic information that can be accessed to improve tissue function.**
Yuancheng Lu, Benedikt Brommer[...] & David A. Sinclair
14. **Differences in the mechanical properties of individual cardiomyocytes drive their segregation into compact versus trabecular layer, thereby transforming the myocardium in a developing heart from a simple epithelium into an intricately patterned tissue with distinct cell fates.**
Rashmi Priya, Srinivas Allanki[...] & Didier Y. R. Stainier
15. **The levels of 1,251 metabolites are measured in 475 phenotyped individuals, and machine-learning algorithms reveal that diet and the microbiome are the determinants with the strongest predictive power for the levels of these metabolites.**
Noam Bar, Tal Korem[...] & Eran Segal
16. **The authors show that large endogenous viral elements derived from giant viruses are prominent components of green algal genomes.**
Mohammad Moniruzzaman, Alaina R. Weinheimer[...] & Frank O. Aylward
17. **Blockade of the C5a–C5aR1 axis using anti-C5aR1 monoclonal antibodies prevented inflammation associated with COVID-19.**
Julien Carvelli, Olivier Demaria[...] & Eric Vivier
18. **Blockade of lymphotoxin β -receptor (LT β R) signalling restores WNT signalling and epithelial repair in a model of chronic obstructive pulmonary disease.**
Thomas M. Conlon, Gerrit John-Schuster[...] & Ali Önder Yildirim
19. **Inhibition of YBX1, a downstream target of the Janus kinase JAK2, sensitizes myeloproliferative neoplasm cells to JAK and could provide a means to eradicate such cells in human haematopoietic cancers.**
Ashok Kumar Jayavelu, Tina M. Schnöder[...] & Florian H. Heidel
20. **Binding of the small molecule BI-3802 to the oncogenic transcription factor B cell lymphoma 6 (BCL6) induces polymerization of BCL6, leading to its ubiquitination by SIAH1 and proteasomal degradation.**
Mikołaj Słabicki, Hojong Yoon[...] & Benjamin L. Ebert
21. **Inverted-repeat Alu elements are the main source of drug-induced immunogenic double-stranded RNAs, which are destabilized by the RNA deaminase ADAR1, thereby limiting activation of the immune response.**
Parinaz Mehdipour, Sajid A. Marhon[...] & Daniel D. De Carvalho
22. **SLC25A51 is identified as a transporter of intact NAD⁺ into mammalian mitochondria and is required to maintain the mitochondrial NAD⁺ pool and respiratory function.**
Timothy S. Luongo, Jared M. Eller[...] & Joseph A. Baur

Nature

Volume 588 Issue 7837, 10 December 2020

1. **Observations from the eROSITA telescope reveal soft-X-ray-emitting bubbles extending above and below the Galactic plane, which arose from energy injected into the Galactic halo from past activity in the Galactic centre.**
P. Predehl, R. A. Sunyaev[...] & J. Wilms
2. **Correlations in momentum space between hadrons created by ultrarelativistic proton–proton collisions at the CERN Large Hadron Collider provide insights into the strong interaction, particularly the short-range dynamics of hyperons—baryons that contain strange quarks.**
S. Acharya, D. Adamová[...] & N. Zurlo
3. **A strongly interacting gas of polar molecules is created by combining an electric field with two-dimensional optical confinement, enabling evaporative cooling and opening up the exploration of low-entropy many-body phases.**
Giacomo Valtolina, Kyle Matsuda[...] & Jun Ye

4. **By using a stimulated Brillouin scattering laser in a strontium-ion optical clock instead of the usual bulk-cavity-stabilized laser, the need for vacuum is removed and resonator volume is substantially reduced.**
William Loh, Jules Stuart[...] & Robert McConnell
5. **In the tiniest of capillaries, barely larger than a water molecule, condensation is surprisingly predictable from the macroscopic Kelvin condensation equation, a coincidence partially owing to elastic deformation of the capillary walls.**
Qian Yang, P. Z. Sun[...] & A. K. Geim
6. **Hydroamination with high enantio- and regioselectivity is achieved across a wide range of internal alkenes by using a cationic iridium complex that adds an ammonia surrogate containing a pyridine group.**
Yumeng Xi, Senjie Ma & John F. Hartwig
7. **An integrated assessment model analysis shows that a moderately differentiated carbon price could achieve as much climate mitigation as a uniform carbon tax, avoiding concerns regarding equity between participating countries or sovereignty.**
Nico Bauer, Christoph Bertram[...] & Ottmar Edenhofer
8. **In the geographically and taxonomically divided systems of vertebrates in the Living Planet Index, a small percentage of clusters showed extreme declines or increases, whereas most vertebrate populations across all systems showed no mean global trend.**
Brian Leung, Anna L. Hargreaves[...] & Robin Freeman
9. **A crow-sized stem bird, *Falcatakely forsterae*, possesses a long and deep rostrum—a beak morphology that was previously unknown among Mesozoic birds and is similar to that of some crown-group birds, such as toucans.**
Patrick M. O'Connor, Alan H. Turner[...] & Lydia J. Rahantarisoa
10. **Comparison of multiple genome assemblies from wheat reveals extensive diversity that results from the complex breeding history of wheat and provides a basis for further potential improvements to this important food crop.**
Sean Walkowiak, Liangliang Gao[...] & Curtis J. Pozniak
11. **Chromosome-scale sequence assemblies of 20 diverse varieties of barley are used to construct a first-generation pan-genome, revealing previously hidden genetic variation that can be used by studies aimed at crop improvement**
Murukarthick Jayakodi, Sudharsan Padmarasu[...] & Nils Stein
12. **PIEZO2 is expressed in the bladder urothelium and sensory neurons innervating the lower urinary tract and is a key mechanosensor for the control of urination.**
Kara L. Marshall, Dimah Saade[...] & Ardem Patapoutian
13. **A cell-surface fragment complementation strategy is used to identify the proteome at the junction of astrocytes and synapses in vivo, and shows that NRCAM expressed in astrocytes has a key role in regulating inhibitory synapse function.**
Tetsuya Takano, John T. Wallace[...] & Scott H. Soderling
14. **Influence of the gut microbiome on the human immune system is revealed by systems analysis of vast clinical data from decades of electronic health records paired with massive longitudinal microbiome sequencing.**
Jonas Schluter, Jonathan U. Peled[...] & Joao B. Xavier
15. **LDLRAD3 is a receptor for infection with Venezuelan equine encephalitis virus, and in mouse models deletion of *Ldlrad3* or treatment with a soluble LDLRAD3 decoy molecule abrogates infection and disease caused by this virus.**
Hongming Ma, Arthur S. Kim[...] & Michael S. Diamond
16. **Male patients with COVID-19 have higher plasma levels of innate immune cytokines and chemokines such as IL-8, IL-18 and CCL5 and more non-classical monocytes than female patients, whereas female patients mount robust T cell activation maintained even in older age.**
Takehiro Takahashi, Mallory K. Ellingson[...] & Akiko Iwasaki
17. **Antibody selection and maturation within B cells found in gut-associated germinal centres is stimulated by the gut microbiota, to a degree that depends on the presence and composition of the microbes.**
Carla R. Nowosad, Luka Mesin[...] & Gabriel D. Victora
18. **Cryo-electron microscopy structures of consecutive binding events of ACE2 in complex with the spike protein of SARS-CoV-2 reveal the mechanisms of receptor binding by the spike protein and activation for membrane fusion by the spike protein of SARS-CoV-2.**
Donald J. Benton, Antoni G. Wrobel[...] & Steven J. Gamblin

19. **A method in which pooled barcoded human cancer cell lines are injected into a mouse xenograft model enables simultaneous mapping of the metastatic potential of multiple cell lines, and shows that breast cancer cells that metastasize to the brain have altered lipid metabolism.**
Xin Jin, Zelalem Demere[...] & Todd R. Golub
20. **A comprehensive map of transcriptomes, cis-regulatory elements, heterochromatin structure, the methylome and 3D genome organization in the zebrafish (*Danio rerio*) enables identification of species-specific and evolutionarily conserved regulatory features, and provides a foundation for modelling studies on human disease and development.**
Hongbo Yang, Yu Luan[...] & Feng Yue
21. **The structure of the catalytic half of LRRK2 and an atomic model of microtubule-associated LRRK2 suggest that the conformation of the kinase controls the association of LRRK2 with microtubules.**
C. K. Deniston, J. Salogiannis[...] & A. E. Leschziner
22. **Cryo-electron microscopy structures of the human proton-activated chloride channel (PAC) shed light on its pH-dependent gating mechanism and anion selectivity.**
Zheng Ruan, James Osei-Owusu[...] & Wei Lü

Nature

Volume 588 Issue 7838, 17 December 2020

1. **Spin transport far from equilibrium is studied in a Heisenberg model with adjustable anisotropy realized with coupled ultracold ^7Li atoms, and different dynamical regimes are found for positive and negative anisotropies.**
Paul Niklas Jepsen, Jesse Amato-Grill[...] & Wolfgang Ketterle
2. **A tweezer clock containing about 150 ^{88}Sr atoms achieves trapping and optical excited-state lifetimes exceeding 40 seconds, and shows relative fractional frequency stability similar to that of leading atomic clocks.**
Aaron W. Young, William J. Eckner[...] & Adam M. Kaufman
3. **A many-atom state of trapped ^{171}Yb atoms that are entangled on an optical atomic-clock transition overcomes the standard quantum limit, providing a proof-of-principle demonstration towards entanglement-based optical atomic clocks.**
Edwin Pedrozo-Peñafiel, Simone Colombo[...] & Vladan Vuletić
4. **The number of edge channels in quantum anomalous Hall insulators is controlled by varying either the magnetic dopant concentration or the interior spacer layer thickness, yielding Chern numbers up to 5.**
Yi-Fan Zhao, Ruoxi Zhang[...] & Cui-Zu Chang
5. **A van der Waals structure based on a two-dimensional magnet and layered superconductor offers a potential system in which topological superconductivity could be easily tuned and integrated into devices.**
Shawulienu Kezilebieke, Md Nurul Huda[...] & Peter Liljeroth
6. **An anion and metal ion template is used to form woven polymer patches that are joined together by polymerization into a fully woven, two-dimensional, molecular patchwork.**
David P. August, Robert A. W. Dryfe[...] & Robert J. Young
7. **Validated barrier inventories and modelling indicate that Europe's rivers are fragmented by more than one million barriers, such as dams, weirs and fords, causing major impacts on biodiversity.**
Barbara Belletti, Carlos Garcia de Leaniz[...] & Maciej Zalewski
8. **Estimates of global total biomass (the mass of all living things) and anthropogenic mass (the mass embedded in inanimate objects made by humans) over time show that we are roughly at the timepoint when anthropogenic mass exceeds total biomass.**
Emily Elhacham, Liad Ben-Uri[...] & Ron Milo
9. **Lagerpetids, bipedal archosaurs that are thought to be related to dinosaurs, are instead a sister group to pterosaurs, and although they have no obvious flight adaptations they share numerous synapomorphies with pterosaurs across the entire skeleton.**
Martín D. Ezcurra, Sterling J. Nesbitt[...] & Max C. Langer
10. **Direct electrical stimulation of the brain in rhesus monkeys (*Macaca mulatta*) predictably varied subjective valuation and choices, linking valuation and economic decision making to the orbitofrontal cortex.**
Sébastien Ballesta, Weikang Shi[...] & Camillo Padoa-Schioppa

11. **The components of active zones at neuronal synapses are well known, but the processes underlying the assembly of these structures are less so; here, a role for liquid–liquid phase separation of scaffold proteins is identified.**
Nathan A. McDonald, Richard D. Fetter & Kang Shen
12. **In the absence of progranulin, microglia enter a disease-specific state that causes endolysosomal dysfunction and neurodegeneration, and these microglia promote TDP-43 granule formation, nuclear pore defects and cell death specifically in excitatory neurons via the complement activation pathway.**
Jiasheng Zhang, Dmitry Velmeshev[...] & Eric J. Huang
13. **Single-cell and single-nucleus RNA sequencing are used to construct a cellular atlas of the human heart that will aid further research into cardiac physiology and disease.**
Monika Litviňuková, Carlos Talavera-López[...] & Sarah A. Teichmann
14. **Thermal proteome profiling combined with a reverse genetics approach provides insights into the abundance and thermal stability of the global proteome of Escherichia coli.**
André Mateus, Johannes Hevler[...] & Mikhail M. Savitski
15. **mTORC1 stabilizes HMG-CoA reductase, a rate-limiting enzyme in the cholesterol biosynthesis pathway, via the deubiquitylase USP20 in response to feeding.**
Xiao-Yi Lu, Xiong-Jie Shi[...] & Bao-Liang Song
16. **An antibody Fc domain variant with enhanced binding to an activating Fc receptor on dendritic cells promotes the induction of a protective CD8 T cell response.**
Stylianos Bournazos, Davide Corti[...] & Jeffrey V. Ravetch
17. **IFITM3 shifts upon phosphorylation from acting as an antiviral effector to being a scaffold for PIP3 and thereby amplifies PI3K signalling, which can be co-opted for malignant transformation in B cell leukaemia and lymphoma.**
Jaewoong Lee, Mark E. Robinson[...] & Markus Müschen
18. **Cryo-electron microscopy and tomography studies reveal the structures, conformations and distributions of spike protein trimers on intact severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) virions and provide a basis for understanding the interactions of the spike protein with neutralizing antibodies.**
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Zachary L. Fuller, Veronique J. L. Mocellin, Luke A. Morris, Neal Cantin, Jihanne Shepherd, Luke Sarre, Julie Peng, Yi Liao, Joseph Pickrell, Peter Andolfatto, Mikhail Matz, Line K. Bay, Molly Przeworski
3. **A brainwide atlas of synapses across the mouse life span**
Mélissa Cizeron, Zhen Qiu, Babis Koniaris, Ragini Gokhale, Noboru H. Komiyama, Erik Fransén, Seth G. N. Grant
4. **Cancer cells deploy lipocalin-2 to collect limiting iron in leptomeningeal metastasis**
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5. **Ancient DNA indicates human population shifts and admixture in northern and southern China**

Melinda A. Yang, Xuechun Fan, Bo Sun, Chungyu Chen, Jianfeng Lang, Ying-Chin Ko, Cheng-hwa Tsang, Hunglin Chiu, Tianyi Wang, Qingchuan Bao, Xiaohong Wu, Mateja Hajdinjak, Albert Min-Shan Ko, Manyu Ding, Peng Cao, Ruowei Yang, Feng Liu, Birgit Nickel, Qingyan Dai, Xiaotian Feng, Lizhao Zhang, Chengkai Sun, Chao Ning, Wen Zeng, Yongsheng Zhao, Ming Zhang, Xing Gao, Yinqiu Cui, David Reich, Mark Stoneking, Qiaomei Fu

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- 1. Simultaneous cross-evaluation of heterogeneous E. coli datasets via mechanistic simulation**
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- 2. Diverse variola virus (smallpox) strains were widespread in northern Europe in the Viking Age**
Barbara Mühlemann, Lasse Vinner, Ashot Margaryan, Helene Wilhelmson, Constanza de la Fuente Castro, Morten E. Allentoft, Peter de Barros Damgaard, Anders Johannes Hansen, Sofie Holtsmark Nielsen, Lisa Mariann Strand, Jan Bill, Alexandra Buzhilova, Tamara Pushkina, Ceri Falys, Valeri Khartanovich, Vyacheslav Moiseyev, Marie Louise Schjellerup Jørkov, Palle Østergaard Sørensen, Yvonne Magnusson, Ingrid Gustin, Hannes Schroeder, Gerd Sutter, Geoffrey L. Smith, Christian Drosten, Ron A. M. Fouchier, Derek J. Smith, Eske Willerslev, Terry C. Jones, Martin Sikora
- 3. Cooperative carbon capture and steam regeneration with tetraamine-appended metal-organic frameworks**
Eugene J. Kim, Rebecca L. Siegelman, Henry Z. H. Jiang, Alexander C. Forse, Jung-Hoon Lee, Jeffrey D. Martell, Phillip J. Milner, Joseph M. Falkowski, Jeffrey B. Neaton, Jeffrey A. Reimer, Simon C. Weston, Jeffrey R. Long
- 4. Chaperone-mediated autophagy regulates the pluripotency of embryonic stem cells**
Yi Xu, Yang Zhang, Juan C. García-Cañaveras, Lili Guo, Mengyuan Kan, Sixiang Yu, Ian A. Blair, Joshua D. Rabinowitz, Xiaolu Yang
- 5. The activities of drug inactive ingredients on biological targets**
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- 6. The impact of COVID-19 and strategies for mitigation and suppression in low- and middle-income countries**
Patrick G. T. Walker, Charles Whittaker, Oliver J. Watson, Marc Baguelin, Peter Winskill, Arran Hamlet, Bimandra A. Djafaara, Zulma Cucunubá, Daniela Olivera Mesa, Will Green, Hayley Thompson, Shevanthi Nayagam, Kylie E. C. Ainslie, Sangeeta Bhatia, Samir Bhatt, Adhiratha Boonyasiri, Olivia Boyd, Nicholas F. Brazeau, Lorenzo Cattarino, Gina Cuomo-Dannenburg, Amy Dighe, Christl A. Donnelly, Iaria Dorigatti, Sabine L. van Elsland, Rich FitzJohn, Han Fu, Katy A. M. Gaythorpe, Lily Geidelberg, Nicholas Grassly, David Haw, Sarah Hayes, Wes Hinsley, Natsuko Imai, David Jorgensen, Edward Knock, Daniel Laydon, Swapnil Mishra, Gemma Nedjati-Gilani, Lucy C. Okell, H. Juliette Unwin, Robert Verity, Michaela Vollmer, Caroline E. Walters, Haowei Wang, Yuanrong Wang, Xiaoyue Xi, David G. Lalloo, Neil M. Ferguson, Azra C. Ghani
- 7. Determining plasmonic hot-carrier energy distributions via single-molecule transport measurements**
Harsha Reddy, Kun Wang, Zhaxylyk Kudyshev, Linxiao Zhu, Shen Yan, Andrea Vezzoli, Simon J. Higgins, Vikram Gavini, Alexandra Boltasseva, Pramod Reddy, Vladimir M. Shalaev, Edgar Meyhofer
- 8. Ultrahigh-strength and ductile superlattice alloys with nanoscale disordered interfaces**
T. Yang, Y. L. Zhao, W. P. Li, C. Y. Yu, J. H. Luan, D. Y. Lin, L. Fan, Z. B. Jiao, W. H. Liu, X. J. Liu, J. J. Kai, J. C. Huang, C. T. Liu
- 9. Structural basis for membrane insertion by the human ER membrane protein complex**
Tino Pleiner, Giovanni Pinton Tomaleri, Kurt Januszzyk, Alison J. Inglis, Masami Hazu, Rebecca M. Voorhees
- 10. Remote structuring of near-field landscapes**

Vincent Ginis, Marco Piccardo, Michele Tamagnone, Jinsheng Lu, Min Qiu, Simon Kheifets, Federico Capasso

11. An evolution-based model for designing chorismate mutase enzymes

William P. Russ, Matteo Figliuzzi, Christian Stocker, Pierre Barrat-Charlaix, Michael Socolich, Peter Kast, Donald Hilvert, Remi Monasson, Simona Cocco, Martin Weigt, Rama Ranganathan

12. Anomalous absorption of electromagnetic waves by 2D transition metal carbonitride Ti₃CNT_x (MXene)

Aamir Iqbal, Faisal Shahzad, Kanit Hantanasirisakul, Myung-Ki Kim, Jisung Kwon, Junpyo Hong, Hyerim Kim, Daesin Kim, Yury Gogotsi, Chong Min Koo

13. Itaconate is an effector of a Rab GTPase cell-autonomous host defense pathway against Salmonella

Meixin Chen, Hui Sun, Maikel Boot, Lin Shao, Shu-Jung Chang, Weiwei Wang, Tukiet T. Lam, Maria Lara-Tejero, E. Hesper Rego, Jorge E. Galán

14. Genomic insights into the early peopling of the Caribbean

Kathrin Nägele, Cosimo Posth, Miren Iraeta Orbegozo, Yadira Chinique de Armas, Silvia Teresita Hernández Godoy, Ulises M. González Herrera, María A. Nieves-Colón, Marcela Sandoval-Velasco, Dorothea Mylopotamitaki, Rita Radzeviciute, Jason Laffoon, William J. Pestle, Jazmin Ramos-Madrigal, Thiseas C. Lamnidis, William C. Schaffer, Robert S. Carr, Jane S. Day, Carlos Arredondo Antúnez, Armando Rangel Rivero, Antonio J. Martínez-Fuentes, Edwin Crespo-Torres, Ivan Roksandic, Anne C. Stone, Carles Lalueza-Fox, Menno Hoogland, Mirjana Roksandic, Corinne L. Hofman, Johannes Krause, Hannes Schroeder

15. Large-scale mutation in the evolution of a gene complex for cryptic coloration

Romain Villoutreix, Clarissa F. de Carvalho, Víctor Soria-Carrasco, Dorothea Lindtke, Marisol De-la-Mora, Moritz Muschick, Jeffrey L. Feder, Thomas L. Parchman, Zach Gompert, Patrik Nosil

16. Cell growth dilutes the cell cycle inhibitor Rb to trigger cell division

Evgeny Zatulovskiy, Shuyuan Zhang, Daniel F. Berenson, Benjamin R. Topacio, Jan M. Skotheim

Science

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1. Structural insights into differences in G protein activation by family A and family B GPCRs

Daniel Hilger, Kaavya Krishna Kumar, Hongli Hu, Mie Fabricius Pedersen, Evan S. O'Brien, Lise Giehm, Christine Jennings, Gözde Eskici, Asuka Inoue, Michael Lerch, Jesper Mosolf Mathiesen, Georgios Skiniotis, Brian K. Kobilka

2. ANGEL2 is a member of the CCR4 family of deadenylases with 2',3'-cyclic phosphatase activity

Paola H. Pinto, Alena Kroupova, Alexander Schleiffer, Karl Mechtler, Martin Jinek, Stefan Weitzer, Javier Martinez

3. Human fetal microglia acquire homeostatic immune-sensing properties early in development

L. Kracht, M. Borggrewe, S. Eskandar, N. Brouwer, S. M. Chuva de Sousa Lopes, J. D. Laman, S. A. Scherjon, J. R. Prins, S. M. Kooistra, B. J. L. Eggen

4. Boosted molecular mobility during common chemical reactions

Huan Wang, Myeonggon Park, Ruoyu Dong, Junyoung Kim, Yoon-Kyoung Cho, Tsvi Tlusty, Steve Granick

5. Exceptional plasticity in the bulk single-crystalline van der Waals semiconductor InSe

Tian-Ran Wei, Min Jin, Yuecun Wang, Hongyi Chen, Zhiqiang Gao, Kunpeng Zhao, Pengfei Qiu, Zhiwei Shan, Jun Jiang, Rongbin Li, Lidong Chen, Jian He, Xun Shi

6. Human-specific ARHGAP11B increases size and folding of primate neocortex in the fetal marmoset

Michael Heide, Christiane Haffner, Ayako Murayama, Yoko Kurotaki, Haruka Shinohara, Hideyuki Okano, Erika Sasaki, Wieland B. Huttner

7. Cooling and entangling ultracold atoms in optical lattices

Bing Yang, Hui Sun, Chun-Jiong Huang, Han-Yi Wang, Youjin Deng, Han-Ning Dai, Zhen-Sheng Yuan, Jian-Wei Pan

8. In-cell architecture of an actively transcribing-translating expressome

Francis J. O'Reilly, Liang Xue, Andrea Graziadei, Ludwig Sinn, Swantje Lenz, Dmitry Tegunov, Cedric Blötz, Neil Singh, Wim J. H. Hagen, Patrick Cramer, Jörg Stülke, Julia Mahamid, Juri Rappsilber

9. Direct reversible decarboxylation from stable organic acids in dimethylformamide solution

Duanyang Kong, Patrick J. Moon, Erica K. J. Lui, Odey Bsharat, Rylan J. Lundgren

10. **Allele-specific open chromatin in human iPSC neurons elucidates functional disease variants**
Siwei Zhang, Hanwen Zhang, Yifan Zhou, Min Qiao, Siming Zhao, Alena Kozlova, Jianxin Shi, Alan R. Sanders, Gao Wang, Kaixuan Luo, Subhajit Sengupta, Siobhan West, Sheng Qian, Michael Streit, Dimitrios Avramopoulos, Chad A. Cowan, Mengjie Chen, Zhiping P. Pang, Pablo V. Gejman, Xin He, Jubao Duan
11. **DNA capture by a CRISPR-Cas9–guided adenine base editor**
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12. **Rational synthesis of atomically precise graphene nanoribbons directly on metal oxide surfaces**
Marek Kolmer, Ann-Kristin Steiner, Irena Izydorczyk, Wonhee Ko, Mads Engelund, Marek Szymanski, An-Ping Li, Konstantin Amsharov
13. **Disparities in PM2.5 air pollution in the United States**
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14. **Ancient orogenic and monsoon-driven assembly of the world's richest temperate alpine flora**
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15. **Genomic surveillance reveals multiple introductions of SARS-CoV-2 into Northern California**
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16. **A physics-based method that can predict imminent large solar flares**
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Volume 369, Issue 6504, 7 August 2020

1. **The proteasome controls ESCRT-III–mediated cell division in an archaeon**
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2. **Potent neutralizing antibodies from COVID-19 patients define multiple targets of vulnerability**
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3. **A neutralizing human antibody binds to the N-terminal domain of the Spike protein of SARS-CoV-2**
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4. **Structural insight into precursor ribosomal RNA processing by ribonuclease MRP**
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5. **Ligand-recognizing motifs in plant LysM receptors are major determinants of specificity**
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- Kofoed, Sébastien Fort, John T. Sullivan, Clive W. Ronson, Knud J. Jensen, Mickaël Blaise, Giles Oldroyd, Jens Stougaard, Kasper R. Andersen, Simona Radutoiu
6. **Chemical vapor deposition of layered two-dimensional MoSi₂N₄ materials**
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 7. **Sequencing of metals in multivariate metal-organic frameworks**
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 8. **Emergent helical texture of electric dipoles**
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 9. **A new wrinkle on liquid sheets: Turning the mechanism of viscous bubble collapse upside down**
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 10. **How hair deforms steel**
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 11. **Global maps of the magnetic field in the solar corona**
Zihao Yang, Christian Bethge, Hui Tian, Steven Tomczyk, Richard Morton, Giulio Del Zanna, Scott W. McIntosh, Bidya Binay Karak, Sarah Gibson, Tanmoy Samanta, Jiansen He, Yajie Chen, Linghua Wang
 12. **Cell-cell adhesion in plant grafting is facilitated by β -1,4-glucanases**
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 13. **Unexpected air pollution with marked emission reductions during the COVID-19 outbreak in China**
Tianhao Le, Yuan Wang, Lang Liu, Jiani Yang, Yuk L. Yung, Guohui Li, John H. Seinfeld
 14. **Type III interferons disrupt the lung epithelial barrier upon viral recognition**
Achille Broggi, Sreya Ghosh, Benedetta Sposito, Roberto Spreafico, Fabio Balzarini, Antonino Lo Cascio, Nicola Clementi, Maria De Santis, Nicasio Mancini, Francesca Granucci, Ivan Zanoni
 15. **Type I and III interferons disrupt lung epithelial repair during recovery from viral infection**
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 16. **Impaired type I interferon activity and inflammatory responses in severe COVID-19 patients**
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 17. **A short de novo synthesis of nucleoside analogs**
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 18. **Broad neutralization of SARS-related viruses by human monoclonal antibodies**
Anna Z. Wec, Daniel Wrapp, Andrew S. Herbert, Daniel P. Maurer, Denise Haslwanter, Mrunal Sakharkar, Rohit K. Jangra, M. Eugenia Dieterle, Asparouh Lilov, Deli Huang, Longping V. Tse, Nicole V. Johnson, Ching-Lin Hsieh, Nianshuang Wang, Juergen H. Nett, Elizabeth Champney, Irina Burnina, Michael Brown, Shu Lin, Melanie Sinclair, Carl Johnson, Sarat Pudi, Robert Bortz III, Ariel S. Wirchnianski, Ethan Laudermitch, Catalina Florez, J. Maximilian Fels, Cecilia M. O'Brien, Barney S. Graham, David Nemazee, Dennis R. Burton, Ralph S. Baric, James E. Voss, Kartik Chandran, John M. Dye, Jason S. McLellan, Laura M. Walker

Science

Volume 369, Issue 6505, 14 August 2020

1. **Huntington's disease alters human neurodevelopment**
Monia Barnat, Mariacristina Capizzi, Esther Aparicio, Susana Boluda, Doris Wennagel, Radhia Kacher, Rayane Kassem, Sophie Lenoir, Fabienne Agasse, Barbara Y. Braz, Jeh-Ping Liu, Julien Ighil, Aude Tessier, Scott O. Zeitlin, Charles Duyckaerts, Marc Dommergues, Alexandra Durr, Sandrine Humbert
2. **Binding mechanisms of therapeutic antibodies to human CD20**

- Anand Kumar, Cyril Planchais, Rémi Fronzes, Hugo Mouquet, Nicolas Reyes
3. **Divergent synthesis of complex diterpenes through a hybrid oxidative approach**
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 4. **DNA vaccine protection against SARS-CoV-2 in rhesus macaques**
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 5. **SARS-CoV-2 infection protects against rechallenge in rhesus macaques**
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 6. **Primary exposure to SARS-CoV-2 protects against reinfection in rhesus macaques**
Wei Deng, Linlin Bao, Jiangning Liu, Chong Xiao, Jiayi Liu, Jing Xue, Qi Lv, Feifei Qi, Hong Gao, Pin Yu, Yanfeng Xu, Yajin Qu, Fengdi Li, Zhiguang Xiang, Haisheng Yu, Shuran Gong, Mingya Liu, Guanpeng Wang, Shunyi Wang, Zhiqi Song, Ying Liu, Wenjie Zhao, Yunlin Han, Linna Zhao, Xing Liu, Qiang Wei, Chuan Qin
 7. **BAF restricts cGAS on nuclear DNA to prevent innate immune activation**
Baptiste Guey, Marilena Wischnewski, Alexiane Decout, Kristina Makasheva, Murat Kaynak, Mahmut S. Sakar, Beat Fierz, Andrea Ablasser
 8. **Trophic pyramids reorganize when food web architecture fails to adjust to ocean change**
Ivan Nagelkerken, Silvan U. Goldenberg, Camilo M. Ferreira, Hadayet Ullah, Sean D. Connell
 9. **Observation of small Fermi pockets protected by clean CuO₂ sheets of a high-Tc superconductor**
So Kunisada, Shunsuke Isono, Yoshimitsu Kohama, Shiro Sakai, Cédric Bareille, Shunsuke Sakuragi, Ryo Noguchi, Kifu Kurokawa, Kenta Kuroda, Yukiaki Ishida, Shintaro Adachi, Ryotaro Sekine, Timur K. Kim, Cephise Cacho, Shik Shin, Takami Tohyama, Kazuyasu Tokiwa, Takeshi Kondo
 10. **Active restoration accelerates the carbon recovery of human-modified tropical forests**
Christopher D. Philipson, Mark E. J. Cutler, Philip G. Brodrick, Gregory P. Asner, Doreen S. Boyd, Pedro Moura Costa, Joel Fiddes, Giles M. Foody, Geertje M. F. van der Heijden, Alicia Ledo, Philippa R. Lincoln, James A. Margrove, Roberta E. Martin, Sol Milne, Michelle A. Pinard, Glen Reynolds, Martijn Snoep, Hamzah Tangki, Yap Sau Wai, Charlotte E. Wheeler, David F. R. P. Burslem
 11. **Importin α 3 regulates chronic pain pathways in peripheral sensory neurons**
Letizia Marvaldi, Nicolas Panayotis, Stefanie Alber, Shachar Y. Dagan, Nataliya Okladnikov, Indrek Koppel, Agostina Di Pizio, Didi-Andreas Song, Yarden Tzur, Marco Terenzio, Ida Rishal, Dalia Gordon, Franziska Rother, Enno Hartmann, Michael Bader, Mike Fainzilber
 12. **A mathematical model reveals the influence of population heterogeneity on herd immunity to SARS-CoV-2**
Tom Britton, Frank Ball, Pieter Trapman
 13. **A molecular mediator for reductive concerted proton-electron transfers via electrocatalysis**
Matthew J. Chalkley, Pablo Garrido-Barros, Jonas C. Peters
 14. **Iron-based superelastic alloys with near-constant critical stress temperature dependence**

Ji Xia, Yuki Noguchi, Xiao Xu, Takumi Odaira, Yuta Kimura, Makoto Nagasako, Toshihiro Omori, Ryoosuke Kainuma

15. Mitochondrial dynamics in postmitotic cells regulate neurogenesis

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16. Fire and grass-bedding construction 200 thousand years ago at Border Cave, South Africa

Lyn Wadley, Irene Esteban, Paloma de la Peña, Marine Wojcieszak, Dominic Stratford, Sandra Lennox, Francesco d'Errico, Daniela Eugenia Rosso, François Orange, Lucinda Backwell, Christine Sievers

17. Building social cohesion between Christians and Muslims through soccer in post-ISIS Iraq

Salma Mousa

Science

Volume 369, Issue 6506, 21 August 2020

1. Neutrophil extracellular traps target senescent vasculature for tissue remodeling in retinopathy

François Binet, Gael Cagnone, Sergio Crespo-Garcia, Masayuki Hata, Mathieu Neault, Agnieszka Dejda, Ariel M. Wilson, Manuel Buscarlet, Gaëlle Tagne Mawambo, Joel P. Howard, Roberto Diaz-Marin, Celia Parinot, Vera Guber, Frédérique Pilon, Rachel Juneau, Rémi Laflamme, Christina Sawchyn, Karine Boulay, Severine Leclerc, Afnan Abu-Thuraia, Jean-François Côté, Gregor Andelfinger, Flavio A. Rezende, Florian Sennlaub, Jean-Sébastien Joyal, Frédéric A. Mallette, Przemyslaw Sapieha

2. An orally available non-nucleotide STING agonist with antitumor activity

Bo-Sheng Pan, Samantha A. Perera, Jennifer A. Piesvaux, Jeremy P. Presland, Gottfried K. Schroeder, Jared N. Cumming, B. Wesley Trotter, Michael D. Altman, Alexei V. Buevich, Brandon Cash, Saso Cemerski, Wonsuk Chang, Yiping Chen, Peter J. Dandliker, Guo Feng, Andrew Haidle, Timothy Henderson, James Jewell, Ilona Kariv, Ian Knemeyer, Johnny Kopinja, Brian M. Lacey, Jason Laskey, Charles A. Lesburg, Rui Liang, Brian J. Long, Min Lu, Yanhong Ma, Ellen C. Minnihan, Greg O'Donnell, Ryan Otte, Laura Price, Larissa Rakhilina, Berengere Sauvagnat, Sharad Sharma, Sriram Tyagarajan, Hyun Woo, Daniel F. Wyss, Serena Xu, David Jonathan Bennett, George H. Addona

3. Cross-reactivity between tumor MHC class I-restricted antigens and an enterococcal bacteriophage

Aurélie Fluckiger, Romain Daillère, Mohamed Sassi, Barbara Susanne Sixt, Peng Liu, Friedemann Loos, Corentin Richard, Catherine Rabu, Maryam Tidjani Alou, Anne-Gaëlle Goubet, Fabien Lemaitre, Gladys Ferrere, Lisa Derosa, Connie P. M. Duong, Meriem Messaoudene, Andréanne Gagné, Philippe Joubert, Luisa De Sordi, Laurent Debarbieux, Sylvain Simon, Clara-Maria Scarlata, Maha Ayyoub, Belinda Palermo, Francesco Facciolo, Romain Boidot, Richard Wheeler, Ivo Gomperts Boneca, Zsófia Sztupinszki, Krisztian Papp, Istvan Csabai, Edoardo Pasolli, Nicola Segata, Carlos Lopez-Otin, Zoltan Szallasi, Fabrice Andre, Valerio Iebba, Valentin Quiniou, David Klatzmann, Jacques Boukhalil, Saber Khelaifia, Didier Raoult, Laurence Albiges, Bernard Escudier, Alexander Eggermont, Fathia Mami-Chouaib, Paola Nistico, François Ghiringhelli, Bertrand Routy, Nathalie Labarrière, Vincent Cattoir, Guido Kroemer, Laurence Zitvogel

4. BTN3A1 governs antitumor responses by coordinating $\alpha\beta$ and $\gamma\delta$ T cells

Kyle K. Payne, Jessica A. Mine, Subir Biswas, Ricardo A. Chaurio, Alfredo Perales-Puchalt, Carmen M. Anadon, Tara Lee Costich, Carly M. Harro, Jennifer Walrath, Qianqian Ming, Evgenii Tcyganov, Andrea L. Buras, Kristen E. Rigolizzo, Gunjan Mandal, Jason Lajoie, Michael Ophir, Julia Tchou, Douglas Marchion, Vincent C. Luca, Piotr Bobrowicz, Brooke McLaughlin, Ugur Eskiocak, Michael Schmidt, Juan R. Cubillos-Ruiz, Paulo C. Rodriguez, Dmitry I. Gabilovich, Jose R. Conejo-Garcia

5. Shaping colloidal bananas to reveal biaxial, splay-bend nematic, and smectic phases

Carla Fernández-Rico, Massimiliano Chiappini, Taiki Yanagishima, Heidi de Sousa, Dirk G. A. L. Aarts, Marjolein Dijkstra, Roel P. A. Dullens

6. Isolation of potent SARS-CoV-2 neutralizing antibodies and protection from disease in a small animal model

Thomas F. Rogers, Fangzhu Zhao, Deli Huang, Nathan Beutler, Alison Burns, Wan-ting He, Oliver Limbo, Chloe Smith, Ge Song, Jordan Woehl, Linlin Yang, Robert K. Abbott, Sean Callaghan, Elijah Garcia, Jonathan Hurtado, Mara Parren, Linghang Peng, Sydney Ramirez, James Ricketts, Michael J. Ricciardi, Stephen A. Rawlings, Nicholas C. Wu, Meng Yuan, Davey

- M. Smith, David Nemazee, John R. Teijaro, James E. Voss, Ian A. Wilson, Raiees Andrabi, Bryan Briney, Elise Landais, Devin Sok, Joseph G. Jardine, Dennis R. Burton
7. **Synchronous timing of abrupt climate changes during the last glacial period**
Ellen C. Corrick, Russell N. Drysdale, John C. Hellstrom, Emilie Capron, Sune Olander Rasmussen, Xu Zhang, Dominik Fleitmann, Isabelle Couchoud, Eric Wolff
 8. **Asymmetric remote C–H borylation of aliphatic amides and esters with a modular iridium catalyst**
Ronald L. Reyes, Miyu Sato, Tomohiro Iwai, Kimichi Suzuki, Satoshi Maeda, Masaya Sawamura
 9. **Attosecond spectroscopy of liquid water**
Inga Jordan, Martin Huppert, Dominik Rattenbacher, Michael Peper, Denis Jelovina, Conaill Perry, Aaron von Conta, Axel Schild, Hans Jakob Wörner
 10. **Covalent surface modifications and superconductivity of two-dimensional metal carbide MXenes**
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 11. **SOSTDC1-producing follicular helper T cells promote regulatory follicular T cell differentiation**
Xin Wu, Yun Wang, Rui Huang, Qujing Gai, Haofei Liu, Meimei Shi, Xiang Zhang, Yonglin Zuo, Longjuan Chen, Qiwen Zhao, Yu Shi, Fengchao Wang, Xiaowei Yan, Huiping Lu, Senlin Xu, Xiaohong Yao, Lin Chen, Xia Zhang, Qiang Tian, Ziyang Yang, Bo Zhong, Chen Dong, Yan Wang, Xiu-Wu Bian, Xindong Liu
 12. **Julich-Brain: A 3D probabilistic atlas of the human brain's cytoarchitecture**
Katrin Amunts, Hartmut Mohlberg, Sebastian Bludau, Karl Zilles
 13. **Antitumor activity of a systemic STING-activating non-nucleotide cGAMP mimetic**
Emily N. Chin, Chenguang Yu, Vincent F. Vartabedian, Ying Jia, Manoj Kumar, Ana M. Gamo, William Vernier, Sabrina H. Ali, Mildred Kissai, Daniel C. Lazar, Nhan Nguyen, Laura E. Pereira, Brent Benish, Ashley K. Woods, Sean B. Joseph, Alan Chu, Kristen A. Johnson, Philipp N. Sander, Francisco Martínez-Peña, Eric N. Hampton, Travis S. Young, Dennis W. Wolan, Arnab K. Chatterjee, Peter G. Schultz, H. Michael Petrassi, John R. Teijaro, Luke L. Lairson
 14. **Abrupt CO₂ release to the atmosphere under glacial and early interglacial climate conditions**
C. Nehrbass-Ahles, J. Shin, J. Schmitt, B. Bereiter, F. Joos, A. Schilt, L. Schmidely, L. Silva, G. Teste, R. Grilli, J. Chappellaz, D. Hodell, H. Fischer, T. F. Stocker
 15. **Architecture and function of human uromodulin filaments in urinary tract infections**
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 16. **Studies in humanized mice and convalescent humans yield a SARS-CoV-2 antibody cocktail**
Johanna Hansen, Alina Baum, Kristen E. Pascal, Vincenzo Russo, Stephanie Giordano, Elzbieta Wloga, Benjamin O. Fulton, Ying Yan, Katrina Koon, Krunal Patel, Kyung Min Chung, Aynur Hermann, Erica Ullman, Jonathan Cruz, Ashique Rafique, Tammy Huang, Jeanette Fairhurst, Christen Libertiny, Marine Malbec, Wen-yi Lee, Richard Welsh, Glen Farr, Seth Pennington, Dipali Deshpande, Jemmie Cheng, Anke Watty, Pascal Bouffard, Robert Babb, Natasha Levenkova, Calvin Chen, Bojie Zhang, Annabel Romero Hernandez, Kei Saotome, Yi Zhou, Matthew Franklin, Sumathi Sivapalasingam, David Chien Lye, Stuart Weston, James Logue, Robert Haupt, Matthew Frieman, Gang Chen, William Olson, Andrew J. Murphy, Neil Stahl, George D. Yancopoulos, Christos A. Kyratsous
 17. **Antibody cocktail to SARS-CoV-2 spike protein prevents rapid mutational escape seen with individual antibodies**
Alina Baum, Benjamin O. Fulton, Elzbieta Wloga, Richard Copin, Kristen E. Pascal, Vincenzo Russo, Stephanie Giordano, Kathryn Lanza, Nicole Negron, Min Ni, Yi Wei, Gurinder S. Atwal, Andrew J. Murphy, Neil Stahl, George D. Yancopoulos, Christos A. Kyratsous

Science

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1. **Neural mechanisms resolving exploitation-exploration dilemmas in the medial prefrontal cortex**
Philippe Domenech, Sylvain Rheims, Etienne Koechlin
2. **A heterogeneous microbial consortium producing short-chain fatty acids from lignocellulose**

Robert L. Shahab, Simone Brethauer, Matthew P. Davey, Alison G. Smith, Silvia Vignolini, Jeremy S. Luterbacher, Michael H. Studer

3. **A synthetic synaptic organizer protein restores glutamatergic neuronal circuits**
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4. **Seeing around corners: Cells solve mazes and respond at a distance using attractant breakdown**
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5. **Diverse enzymatic activities mediate antiviral immunity in prokaryotes**
Linyi Gao, Han Altae-Tran, Francisca Böhning, Kira S. Makarova, Michael Segel, Jonathan L. Schmid-Burgk, Jeremy Koob, Yuri I. Wolf, Eugene V. Koonin, Feng Zhang
6. **Hartree-Fock on a superconducting qubit quantum computer**
Google AI Quantum and Collaborators, Frank Arute, Kunal Arya, Ryan Babbush, Dave Bacon, Joseph C. Bardin, Rami Barends, Sergio Boixo, Michael Broughton, Bob B. Buckley, David A. Buell, Brian Burkett, Nicholas Bushnell, Yu Chen, Zijun Chen, Benjamin Chiaro, Roberto Collins, William Courtney, Sean Demura, Andrew Dunsworth, Edward Farhi, Austin Fowler, Brooks Foxen, Craig Gidney, Marissa Giustina, Rob Graff, Steve Habegger, Matthew P. Harrigan, Alan Ho, Sabrina Hong, Trent Huang, William J. Huggins, Lev Ioffe, Sergei V. Isakov, Evan Jeffrey, Zhang Jiang, Cody Jones, Dvir Kafri, Kostyantyn Kechedzhi, Julian Kelly, Seon Kim, Paul V. Klimov, Alexander Korotkov, Fedor Kostritsa, David Landhuis, Pavel Laptev, Mike Lindmark, Erik Lucero, Orion Martin, John M. Martinis, Jarrod R. McClean, Matt McEwen, Anthony Megrant, Xiao Mi, Masoud Mohseni, Wojciech Mruczkiewicz, Josh Mutus, Ofer Naaman, Matthew Neeley, Charles Neill, Hartmut Neven, Murphy Yuezhen Niu, Thomas E. O'Brien, Eric Ostby, Andre Petukhov, Harald Putterman, Chris Quintana, Pedram Roushan, Nicholas C. Rubin, Daniel Sank, Kevin J. Satzinger, Vadim Smelyanskiy, Doug Strain, Kevin J. Sung, Marco Szalay, Tyler Y. Takeshita, Amit Vainsencher, Theodore White, Nathan Wiebe, Z. Jamie Yao, Ping Yeh, Adam Zalcman
7. **Architecture of a catalytically active homotrimeric plant cellulose synthase complex**
Pallinti Purushotham, Ruoya Ho, Jochen Zimmer
8. **Using paleo-archives to safeguard biodiversity under climate change**
Damien A. Fordham, Stephen T. Jackson, Stuart C. Brown, Brian Huntley, Barry W. Brook, Dorthe Dahl-Jensen, M. Thomas P. Gilbert, Bette L. Otto-Bliesner, Anders Svensson, Spyros Theodoridis, Janet M. Wilmshurst, Jessie C. Buettel, Elisabetta Canteri, Matthew McDowell, Ludovic Orlando, Julia Pilowsky, Carsten Rahbek, David Nogues-Bravo
9. **A nitrogenase-like enzyme system catalyzes methionine, ethylene, and methane biogenesis**
Justin A. North, Adrienne B. Narowe, Weili Xiong, Kathryn M. Byerly, Guanqi Zhao, Sarah J. Young, Srividya Murali, John A. Wildenthal, William R. Cannon, Kelly C. Wrighton, Robert L. Hettich, F. Robert Tabita
10. **Accelerating water dissociation in bipolar membranes and for electrocatalysis**
Sebastian Z. Oener, Marc J. Foster, Shannon W. Boettcher
11. **Super-durable ultralong carbon nanotubes**
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12. **Serial interval of SARS-CoV-2 was shortened over time by nonpharmaceutical interventions**
Sheikh Taslim Ali, Lin Wang, Eric H. Y. Lau, Xiao-Ke Xu, Zhanwei Du, Ye Wu, Gabriel M. Leung, Benjamin J. Cowling
13. **Earth's water may have been inherited from material similar to enstatite chondrite meteorites**
Laurette Piani, Yves Marrocchi, Thomas Rigaudier, Lionel G. Vacher, Dorian Thomassin, Bernard Marty
14. **Static to inducibly dynamic stereocontrol: The convergent use of racemic β -substituted ketones**
Jacob S. DeHovitz, Yong Yao Loh, Jacob A. Kautzky, Kazunori Nagao, Andrew J. Meichan, Motoshi Yamauchi, David W. C. MacMillan, Todd K. Hyster

15. **Structural basis of a shared antibody response to SARS-CoV-2**
Meng Yuan, Hejun Liu, Nicholas C. Wu, Chang-Chun D. Lee, Xueyong Zhu, Fangzhu Zhao, Deli Huang, Wenli Yu, Yuanzi Hua, Henry Tien, Thomas F. Rogers, Elise Landais, Devin Sok, Joseph G. Jardine, Dennis R. Burton, Ian A. Wilson
16. **Zika virus infection enhances future risk of severe dengue disease**
Leah C. Katzelnick, César Narvaez, Sonia Arguello, Brenda Lopez Mercado, Damaris Collado, Oscarlett Ampie, Douglas Elizondo, Tatiana Miranda, Fausto Bustos Carillo, Juan Carlos Mercado, Krista Latta, Amy Schiller, Bruno Segovia-Chumbez, Sergio Ojeda, Nery Sanchez, Miguel Plazaola, Josefina Coloma, M. Elizabeth Halloran, Lakshmanane Premkumar, Aubree Gordon, Federico Narvaez, Aravinda M. de Silva, Guillermina Kuan, Angel Balmaseda, Eva Harris
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18. **Expanding the space of protein geometries by computational design of de novo fold families**
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1. **Regulation of sleep homeostasis mediator adenosine by basal forebrain glutamatergic neurons**
Wanling Peng, Zhaofa Wu, Kun Song, Siyu Zhang, Yulong Li, Min Xu
2. **Changes in regeneration-responsive enhancers shape regenerative capacities in vertebrates**
Wei Wang, Chi-Kuo Hu, An Zeng, Dana Alegre, Deqing Hu, Kirsten Gotting, Augusto Ortega Granillo, Yongfu Wang, Sofia Robb, Robert Schnittker, Shasha Zhang, Dillon Alegre, Hua Li, Eric Ross, Ning Zhang, Anne Brunet, Alejandro Sánchez Alvarado
3. **Reconstitution of autophagosome nucleation defines Atg9 vesicles as seeds for membrane formation**
Justyna Sawa-Makarska, Verena Baumann, Nicolas Coudevylle, Sören von Bülow, Veronika Nogellova, Christine Abert, Martina Schuschnig, Martin Graef, Gerhard Hummer, Sascha Martens
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Divij Mathew, Josephine R. Giles, Amy E. Baxter, Derek A. Oldridge, Allison R. Greenplate, Jennifer E. Wu, Cécile Alanio, Leticia Kuri-Cervantes, M. Betina Pampeña, Kurt D'Andrea, Sasikanth Manne, Zeyu Chen, Yinghui Jane Huang, John P. Reilly, Ariel R. Weisman, Caroline A. G. Ittner, Oliva Kuthuru, Jeanette Dougherty, Kito Nzingha, Nicholas Han, Justin Kim, Ajinkya Pattekar, Eileen C. Goodwin, Elizabeth M. Anderson, Madison E. Weirick, Sigrid Gouma, Claudia P. Arevalo, Marcus J. Bolton, Fang Chen, Simon F. Lacey, Holly Ramage, Sara Cherry, Scott E. Hensley, Sokratis A. Apostolidis, Alexander C. Huang, Laura A. Vella, The UPenn COVID Processing Unit, Michael R. Betts, Nuala J. Meyer, E. John Wherry
5. **Systems biological assessment of immunity to mild versus severe COVID-19 infection in humans**
Prabhu S. Arunachalam, Florian Wimmers, Chris Ka Pun Mok, Ranawaka A. P. M. Perera, Madeleine Scott, Thomas Hagan, Natalia Sigal, Yupeng Feng, Laurel Bristow, Owen Tak-Yin Tsang, Dhananjay Wagh, John Coller, Kathryn L. Pellegrini, Dmitri Kazmin, Ghina Alaaeddine, Wai Shing Leung, Jacky Man Chun Chan, Thomas Shiu Hong Chik, Chris Yau Chung Choi, Christopher Huerta, Michele Paine McCullough, Huibin Lv, Evan Anderson, Srilatha Edupuganti, Amit A. Upadhyay, Steve E. Bosinger, Holden Terry Maecker, Purvesh Khatri, Nadine Roupheal, Malik Peiris, Bali Pulendran
6. **Structure of a human 48S translational initiation complex**
Jailson Brito Querido, Masaaki Sokabe, Sebastian Kraatz, Yuliya Gordiyenko, J. Mark Skehel, Christopher S. Fraser, V. Ramakrishnan
7. **A defined structural unit enables de novo design of small-molecule-binding proteins**
Nicholas F. Polizzi, William F. DeGrado
8. **A triple-star system with a misaligned and warped circumstellar disk shaped by disk tearing**

Stefan Kraus, Alexander Kreplin, Alison K. Young, Matthew R. Bate, John D. Monnier, Tim J. Harries, Henning Avenhaus, Jacques Kluska, Anna S. E. Laws, Evan A. Rich, Matthew Willson, Alicia N. Aarnio, Fred C. Adams, Sean M. Andrews, Narsireddy Anugu, Jaehan Bae, Theo ten Brummelaar, Nuria Calvet, Michel Curé, Claire L. Davies, Jacob Ennis, Catherine Espallat, Tyler Gardner, Lee Hartmann, Sasha Hinkley, Aaron Labdon, Cyprien Lanthermann, Jean-Baptiste LeBouquin, Gail H. Schaefer, Benjamin R. Setterholm, David Wilner, Zhaohuan Zhu

9. Proton-electron mass ratio from laser spectroscopy of HD⁺ at the part-per-trillion level

Sayan Patra, M. Germann, J.-Ph. Karr, M. Haidar, L. Hilico, V. I. Korobov, F. M. J. Cozijn, K. S. E. Eikema, W. Ubachs, J. C. J. Koelemeij

10. Predicting temperature mortality and selection in natural *Drosophila* populations

Enrico L. Rezende, Francisco Bozinovic, András Szilágyi, Mauro Santos

11. Plants sustain the terrestrial silicon cycle during ecosystem retrogression

F. de Tombeur, B. L. Turner, E. Laliberté, H. Lambers, G. Mahy, M.-P. Faucon, G. Zemunik, J.-T. Cornelis

12. Structural basis for translational shutdown and immune evasion by the Nsp1 protein of SARS-CoV-2

Matthias Thoms, Robert Buschauer, Michael Ameisemeier, Lennart Koepke, Timo Denk, Maximilian Hirschenberger, Hanna Kratzat, Manuel Hayn, Timur Mackens-Kiani, Jingdong Cheng, Jan H. Straub, Christina M. Stürzel, Thomas Fröhlich, Otto Berninghausen, Thomas Becker, Frank Kirchhoff, Konstantin M. J. Sparrer, Roland Beckmann

13. Evolution and epidemic spread of SARS-CoV-2 in Brazil

Darlan S. Candido, Ingra M. Claro, Jaqueline G. de Jesus, William M. Souza, Filipe R. R. Moreira, Simon Dellicour, Thomas A. Mellan, Louis du Plessis, Rafael H. M. Pereira, Flavia C. S. Sales, Erika R. Manuli, Julien Thézé, Luiz Almeida, Mariane T. Menezes, Carolina M. Voloch, Marcilio J. Fumagalli, Thaís M. Coletti, Camila A. M. da Silva, Mariana S. Ramundo, Mariene R. Amorim, Henrique H. Hoeltgebaum, Swapnil Mishra, Mandev S. Gill, Luiz M. Carvalho, Lewis F. Buss, Carlos A. Prete Jr., Jordan Ashworth, Helder I. Nakaya, Pedro S. Peixoto, Oliver J. Brady, Samuel M. Nicholls, Amílcar Tanuri, Átila D. Rossi, Carlos K. V. Braga, Alexandra L. Gerber, Ana Paula de C. Guimarães, Nelson Gaburo Jr., Cecília Saete Alencar, Alessandro C. S. Ferreira, Cristiano X. Lima, José Eduardo Levi, Celso Granato, Giulia M. Ferreira, Ronaldo S. Francisco Jr., Fabiana Granja, Marcia T. Garcia, Maria Luiza Moretti, Mauricio W. Perroud Jr., Terezinha M. P. P. Castiñeiras, Carolina S. Lazari, Sarah C. Hill, Andreza Aruska de Souza Santos, Camila L. Simeoni, Julia Forato, Andrei C. Sposito, Angelica Z. Schreiber, Magnun N. N. Santos, Camila Zolini de Sá, Renan P. Souza, Luciana C. Resende-Moreira, Mauro M. Teixeira, Josy Hubner, Patricia A. F. Leme, Rennan G. Moreira, Maurício L. Nogueira, Brazil-UK Centre for Arbovirus Discovery, Diagnosis, Genomics and Epidemiology (CADDE) Genomic Network, Neil M. Ferguson, Silvia F. Costa, José Luiz Proença-Modena, Ana Tereza R. Vasconcelos, Samir Bhatt, Philippe Lemey, Chieh-Hsi Wu, Andrew Rambaut, Nick J. Loman, Renato S. Aguiar, Oliver G. Pybus, Ester C. Sabino, Nuno Rodrigues Faria

14. Engineering human ACE2 to optimize binding to the spike protein of SARS coronavirus 2

Kui K. Chan, Danielle Dorosky, Preeti Sharma, Shawn A. Abbasi, John M. Dye, David M. Kranz, Andrew S. Herbert, Erik Procko

Science

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1. The impact of sex on gene expression across human tissues

Merixell Oliva, Manuel Muñoz-Aguirre, Sarah Kim-Hellmuth, Valentin Wucher, Ariel D. H. Gewirtz, Daniel J. Cotter, Princy Parsana, Silva Kasela, Brunilda Balliu, Ana Viñuela, Stephane E. Castel, Pejman Mohammadi, François Aguet, Yuxin Zou, Ekaterina A. Khramtsova, Andrew D. Skol, Diego Garrido-Martín, Ferran Reverter, Andrew Brown, Patrick Evans, Eric R. Gamazon, Anthony Payne, Rodrigo Bonazzola, Alvaro N. Barbeira, Andrew R. Hamel, Angel Martinez-Perez, José Manuel Soria, GTEx Consortium, Brandon L. Pierce, Matthew Stephens, Eleazar Eskin, Emmanouil T. Dermizakis, Ayellet V. Segrè, Hae Kyung Im, Barbara E. Engelhardt, Kristin G. Ardlie, Stephen B. Montgomery, Alexis J. Battle, Tuuli Lappalainen, Roderic Guigó, Barbara E. Stranger

2. Transcriptomic signatures across human tissues identify functional rare genetic variation

Nicole M. Ferraro, Benjamin J. Strober, Jonah Einson, Nathan S. Abell, Francois Aguet, Alvaro N. Barbeira, Margot Brandt, Maja Bucan, Stephane E. Castel, Joe R. Davis, Emily Greenwald, Gaelen T. Hess, Austin T. Hilliard, Rachel L. Kember, Bence Kotis, YoSon Park, Gina Peloso, Shweta Ramdas, Alexandra J. Scott, Craig Smail, Emily K. Tsang, Seyedeh M. Zekavat, Marcello

Ziosi, Aradhana, TOPMed Lipids Working Group, Kristin G. Ardlie, Themistocles L. Assimes, Michael C. Bassik, Christopher D. Brown, Adolfo Correa, Ira Hall, Hae Kyung Im, Xin Li, Pradeep Natarajan, GTEEx Consortium, Tuuli Lappalainen, Pejman Mohammadi, Stephen B. Montgomery, Alexis Battle

3. Determinants of telomere length across human tissues

Kathryn Demanelis, Farzana Jasmine, Lin S. Chen, Meytal Chernoff, Lin Tong, Dayana Delgado, Chenan Zhang, Justin Shinkle, Mekala Sabarinathan, Hannah Lin, Eduardo Ramirez, Meritxell Oliva, Sarah Kim-Hellmuth, Barbara E. Stranger, Tsung-Po Lai, Abraham Aviv, Kristin G. Ardlie, François Aguet, Habibul Ahsan, GTEEx Consortium, Jennifer A. Doherty, Muhammad G. Kibriya, Brandon L. Pierce

4. Cell type-specific genetic regulation of gene expression across human tissues

Sarah Kim-Hellmuth, François Aguet, Meritxell Oliva, Manuel Muñoz-Aguirre, Silva Kasela, Valentin Wucher, Stephane E. Castel, Andrew R. Hamel, Ana Viñuela, Amy L. Roberts, Serghei Mangul, Xiaoquan Wen, Gao Wang, Alvaro N. Barbeira, Diego Garrido-Martín, Brian B. Nadel, Yuxin Zou, Rodrigo Bonazzola, Jie Quan, Andrew Brown, Angel Martinez-Perez, José Manuel Soria, GTEEx Consortium, Gad Getz, Emmanouil T. Dermizakis, Kerrin S. Small, Matthew Stephens, Hualin S. Xi, Hae Kyung Im, Roderic Guigó, Ayellet V. Segrè, Barbara E. Stranger, Kristin G. Ardlie, Tuuli Lappalainen

5. The GTEEx Consortium atlas of genetic regulatory effects across human tissues

The GTEEx Consortium

Science

Volume 369, Issue 6510, 18 September 2020

1. Species-specific pace of development is associated with differences in protein stability

Teresa Rayon, Despina Stamataki, Ruben Perez-Carrasco, Lorena Garcia-Perez, Christopher Barrington, Manuela Melchionda, Katherine Exelby, Jorge Lazaro, Victor L. J. Tybulewicz, Elizabeth M. C. Fisher, James Briscoe

2. HDAC6 mediates an aggresome-like mechanism for NLRP3 and pyrin inflammasome activation

Venkat Giri Magupalli, Roberto Negro, Yuzi Tian, Arthur V. Hauenstein, Giuseppe Di Caprio, Wesley Skillern, Qiufang Deng, Pontus Orning, Hasan B. Alam, Zoltan Maliga, Humayun Sharif, Jun Jacob Hu, Charles L. Evavold, Jonathan C. Kagan, Florian I. Schmidt, Katherine A. Fitzgerald, Tom Kirchhausen, Yongqing Li, Hao Wu

3. Species-specific segmentation clock periods are due to differential biochemical reaction speeds

Mitsuhiro Matsuda, Hanako Hayashi, Jordi Garcia-Ojalvo, Kumiko Yoshioka-Kobayashi, Ryoichiro Kageyama, Yoshihiro Yamanaka, Makoto Ikeya, Junya Toguchida, Cantas Alev, Miki Ebisuya

4. Evaluating scenarios toward zero plastic pollution

Winnie W. Y. Lau, Yonathan Shiran, Richard M. Bailey, Ed Cook, Martin R. Stuchtey, Julia Koskella, Costas A. Velis, Linda Godfrey, Julien Boucher, Margaret B. Murphy, Richard C. Thompson, Emilia Jankowska, Arturo Castillo Castillo, Toby D. Pilditch, Ben Dixon, Laura Koerselman, Edward Kosior, Enzo Favoino, Jutta Gutberlet, Sarah Baulch, Meera E. Atreya, David Fischer, Kevin K. He, Milan M. Petit, U. Rashid Sumaila, Emily Neil, Mark V. Bernhofen, Keith Lawrence, James E. Palardy

5. Following the microscopic pathway to adsorption through chemisorption and physisorption wells

Dmitriy Borodin, Igor Rahinov, Pranav R. Shirhatti, Meng Huang, Alexander Kandratsenka, Daniel J. Auerbach, Tianli Zhong, Hua Guo, Dirk Schwarzer, Theofanis N. Kitsopoulos, Alec M. Wodtke

6. Assessing the impact of coordinated COVID-19 exit strategies across Europe

N. W. Ruktanonchai, J. R. Floyd, S. Lai, C. W. Ruktanonchai, A. Sadilek, P. Rente-Lourenco, X. Ben, A. Carioli, J. Gwinn, J. E. Steele, O. Prosper, A. Schneider, A. Oplinger, P. Eastham, A. J. Tatem

7. 90S pre-ribosome transformation into the primordial 40S subunit

Jingdong Cheng, Benjamin Lau, Giuseppe La Venuta, Michael Ameismeier, Otto Berninghausen, Ed Hurt, Roland Beckmann

8. Cryo-EM structure of 90S small ribosomal subunit precursors in transition states

Yifei Du, Weidong An, Xing Zhu, Qi Sun, Jia Qi, Keqiong Ye

9. Microbiome-derived inosine modulates response to checkpoint inhibitor immunotherapy

Lukas F. Mager, Regula Burkhard, Nicola Pett, Noah C. A. Cooke, Kirsty Brown, Hena Ramay, Seungil Paik, John Stagg, Ryan A. Groves, Marco Gallo, Ian A. Lewis, Markus B. Geuking, Kathy D. McCoy

10. **Reversible structural transformations in supercooled liquid water from 135 to 245 K**
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