

temperatures. Keystone predators are thus essential not only for trophic structure but also for mitigating the impacts of climate change. —SNV

*Science*, this issue p. 1351

## PARKINSON'S DISEASE PARK7 preservation

Mutations in the gene *PARK7* lead to the development of early-onset Parkinson's disease (PD), a neurodegenerative condition for which there are currently no effective treatments. Boussaad *et al.* identified an exonic splicing mutation in *PARK7* linked to PD and studied the effect of this mutation in patient-derived cellular models. The mutation resulted in impaired splicing, reduced production of the protein DJ-1, and consequent mitochondrial dysfunction. Rescuing the aberrant splicing with a chemical rectifier of aberrant splicing rescued neuronal loss in patient-derived brain organoids. These results suggest that precision medicine targeting specific molecular signatures could be an effective strategy for PD and possibly other neurodegenerative diseases. —MM

*Sci. Transl. Med.* **12**, eaau3960 (2020).

## TROPICAL FOREST Degradation exceeds deforestation

Forest degradation is a ubiquitous form of human disturbance



Roadways in the Brazilian Amazon contribute to damaging forest degradation, even in the absence of outright deforestation.

of the forest landscape. Activities such as selective logging and extraction fall short of total deforestation but lead to loss of biomass and/or fragmentation. On the basis of remote sensing data at 30-meter spatial resolution, Matricardi *et al.* analyzed the extent of forest degradation across the entire Brazilian Amazon over a ~22-year period up to 2014. They found that the extent and rate of forest degradation was equal to or greater than deforestation, which has important implications for carbon, biodiversity, and energy balance. —AMS

*Science*, this issue p. 1378

## METABOLISM Finding calorie restriction mimetics

Calorie restriction extends the health span, and this may be partially mediated by a drop in core body temperature. Guijas *et al.* compared metabolomics data from calorie-restricted mice housed either at thermoneutrality or a cooler temperature. Calorie restriction induced the hypothalamus to produce the gasotransmitter nitric oxide and the opioid peptide leucine enkephalin only in mice housed at the cooler temperature. These and other metabolites differentially altered by ambient temperature may form the basis for treatments that can deliver the beneficial effects of calorie restriction. —WW

*Sci. Signal.* **13**, eabb2490 (2020).

## IN OTHER JOURNALS

Edited by **Caroline Ash**  
and **Jesse Smith**

### CLIMATE WARMING Rapid response

**A**s the climate warms, Arctic temperatures are rising faster than temperatures at lower latitudes, a phenomenon called Arctic amplification. Loss of sea ice and snow cover at high northern latitudes have long been understood to contribute to this behavior, but other mechanisms have been suggested as well. Previdi *et al.* analyzed climate model simulations and conclude that this amplified warming response actually begins before sea ice loss becomes important and that fast atmospheric processes are instead responsible for its initiation. Therefore, the loss of sea ice is an amplifier of enhanced Arctic warming rather than a trigger. —HJS

*Geophys. Res. Lett.* 10.1029/2020GL089933 (2020).

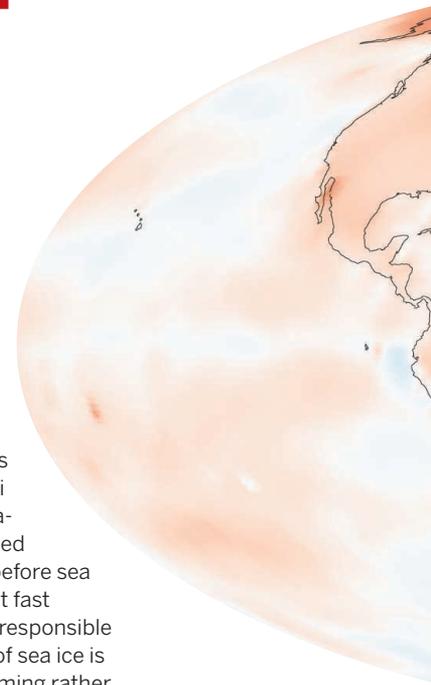
### NEUROSCIENCE Representation of what happened when

Episodic memory depends on the hippocampus and entorhinal cortex. Although the temporal coding properties of hippocampal neurons are well known, the temporal code in the entorhinal cortex, which provides important input to the hippocampus, is less understood. Bright *et al.* examined monkey entorhinal neuron responses in a 5-second period after presentation of an image. Entorhinal neurons were activated shortly after a visual stimulus and then decayed with a variety of rates, enabling reconstruction of when the image was presented. To determine whether the pattern of neuronal activation depended on the identity of the image presented, each image was shown twice during the experiment. These results suggest that entorhinal cortex context cells carry information about what happened in addition to when it happened. —PRS

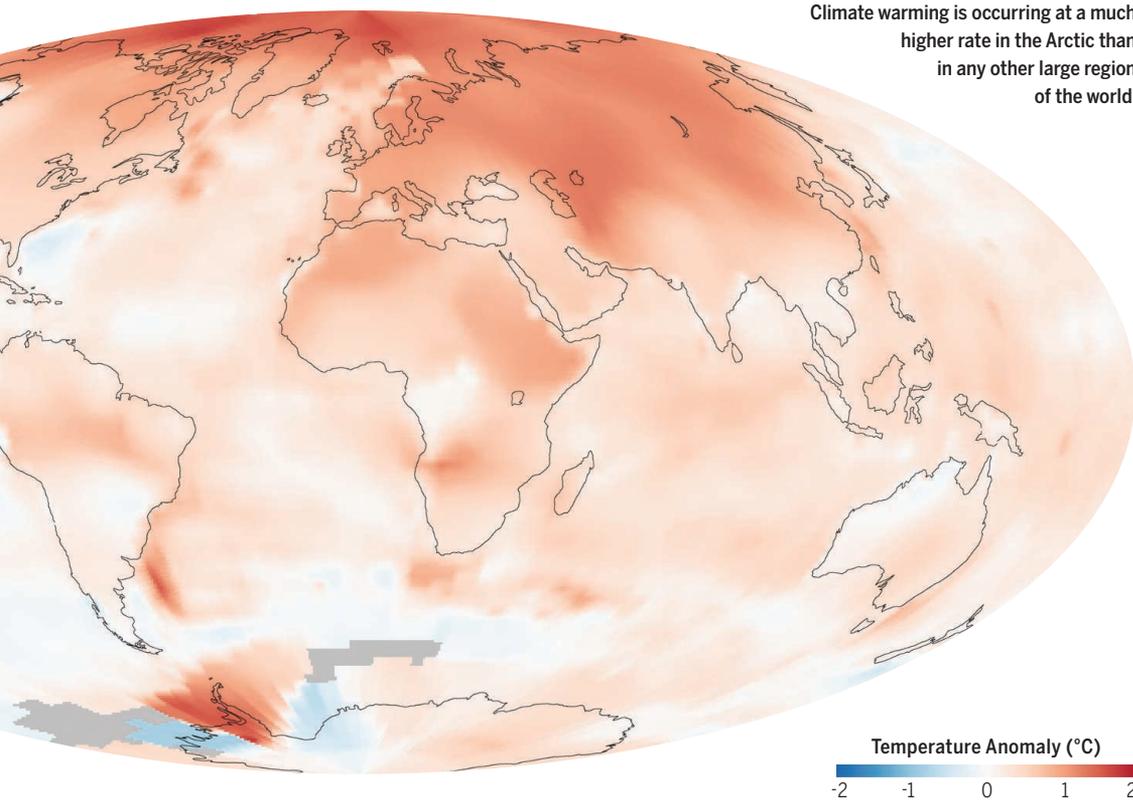
*Proc. Natl. Acad. Sci. U.S.A.* **117**, 20274 (2020).

### HUMAN GENETICS Extending genetic predictions

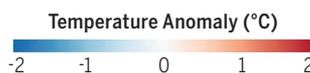
Polygenic risk scores (PRSs) aggregate genomic information to predict an individual's risk of developing diseases with a genetic basis. To determine links between PRSs and health, Wainberg *et al.* profiled the blood plasma of almost 5000 individuals and examined PRSs for 54 diseases. From this, they linked PRSs to 766 detectable traits, including those that affect proteins or metabolites or are clinically relevant. Because many of these relationships were known, this work confirms links between genotype and phenotype and provides a platform for future work. Unexpectedly, some healthy individuals with a PRS indicating high risk for disease had a blood profile similar to those from individuals with disease. This indicates that genetic information can help to separate disease risk factors from the consequences of a pathological condition and



CREDITS (FROM LEFT): ANDRÉ COSTA/ALAMY STOCK PHOTO; NASA IMAGE BY ROBERT SIMMON; BASED ON GIS SURFACE TEMPERATURE ANALYSIS DATA INCLUDING SHIP AND BOAT DATA FROM THE HADLEY CENTRE



Climate warming is occurring at a much higher rate in the Arctic than in any other large region of the world.



identify potential preventative interventions. —LMZ  
*Proc. Natl. Acad. Sci. U.S.A.* **117**, 21813 (2020).

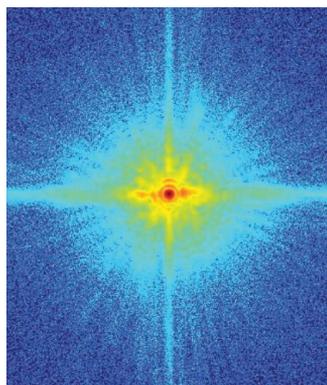
## SIGNAL TRANSDUCTION Spermatogenesis gets a NOD

NOD-like receptors function as pattern recognition receptors in the innate immune system, but some are only expressed in the mammalian germline. Yin *et al.* describe the function of the NOD-like receptor NLRP14 in mice to promote differentiation of primordial germ cell-like cells and spermatogenesis. In this case, the receptor has a signaling role distinct from that of its immune counterparts. NLRP14 formed a complex with the chaperone cofactor BAG2 and with HSPA2, a member of the HSP70 70-kilodalton heat shock protein family. Such binding prevented ubiquitin-mediated proteasomal degradation of HSPA2, allowing it to translocate to the

nucleus, where it helps to package spermatid DNA. —LBR  
*Proc. Natl. Acad. Sci. U.S.A.* **10.1073/pnas.2005533117** (2020).

## ULTRAFAST IMAGING Diffractive imaging in a flash

Ultrashort light pulses on the time scale of attoseconds provide a window into some of the fastest electronic effects occurring in solid-state systems.



Diffraction pattern generated using simulated attosecond pulses for coherent object imaging

Obtaining structural information through coherent diffractive imaging is usually done with monochromatic x-ray sources. However, ultrashort pulses are inherently broadband, and getting transient structural information on such short time scales is challenging. Rana *et al.* describe a method that works with the broadband nature of ultrashort pulses. They split the pulses into 17 different wavelengths and then used an algorithm to computationally stitch together the diffraction patterns from each wavelength to reveal the structural image optimized across all wavelengths. Demonstrating the technique at optical wavelengths illustrates the feasibility of applying the method to ultrafast x-ray pulses. —ISO

*Phys. Rev. Lett.* **125**, 086101 (2020).

## ELECTROCHEMISTRY High-performance aqueous Al-ion batteries

Because of its high abundance, low production cost,

and three-electron redox properties, aluminum (Al) has received considerable attention in recent years for the development of possible alternatives to conventional lithium-based batteries. Yan *et al.* propose an aqueous Al-ion battery configuration consisting of an  $\text{Al}_x\text{MnO}_2$  cathode, a zinc substrate-supported Zn-Al alloy anode, and an  $\text{Al}(\text{OTF})_3$  aqueous electrolyte. This battery demonstrates promising values for key performance indicators such as cycling life, reversible capacity, discharge voltage plateau, and rate capability. The present work is an important step in designing Al-ion-based batteries for practical applications. —YS

*J. Am. Chem. Soc.* **10.1021/jacs.0c05054** (2020).

## CELL BIOLOGY Getting the size right

Double-membraned autophagosomes envelop defunct organelles or intracellular aggregates, allowing them to be delivered to lysosomes, where they are degraded. Autophagy also allows cells to survive short periods of starvation by recycling intracellular components for reuse in critical processes. How do cells manufacture autophagosomes of the right size to engulf targets? Yamamoto *et al.* identified a protein, ERdj8, that is localized to the endoplasmic reticulum (a key source of autophagic membranes) and acts as a size regulator of newly formed autophagosomes. When ERdj8 was inactivated through treatment with small interfering RNA, cells produced small autophagosomes that could not engulf large autophagic targets such as damaged mitochondria. Increasing the amount of ERdj8 delayed autophagosome formation and allowed prolonged extension of the phagophore to yield large autophagosomes. Thus, ERdj8 allows targeting of diverse size objects for recycling. —SMH

*J. Cell Biol.* **219**, e201903127 (2020).