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


TROPICAL FOREST
Degradation exceeds deforestation
Forest degradation is a ubiquitous form of human disturbance even in the absence of outright deforestation. Roadways in the Brazilian Amazon contribute to damaging forest degradation, even in the absence of outright deforestation.

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


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


CLIMATE WARMING
Rapid response
As 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


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


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
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. —IS O


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 Al-MnO$_2$ cathode, a zinc substrate–supported Zn-Al alloy anode, and an Al(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).

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

Cell Biology

Getting the size right

Double-membraned autophagosomes enwrap 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

High-performance aqueous Al-ion batteries
Yury Suleymanov

Science 369 (6509), 1336-1337.
DOI: 10.1126/science.369.6509.1336-f