In other journals

ALZHEIMER’S DISEASE
Developing an immunotherapy for AD
Hyperphosphorylated tau aggregates contribute to neurodegeneration in patients with Alzheimer’s disease (AD), and reducing tau accumulation has had therapeutic effects in preclinical models. Ayalon et al. generated and characterized a humanized anti-tau monoclonal antibody called semorinemab, which they tested in mice and nonhuman primates and in a phase 1 clinical trial in humans. Semorinemab was able to bind all six human tau isoforms and had therapeutic effects in vivo in AD mice by reducing tau accumulation. In patients with AD, semorinemab crossed the blood–brain barrier and showed evidence of target engagement without evident side effects. These results support the idea that immunotherapies targeting tau might be effective in reducing tau pathology in AD. —MM

PLANT SCIENCE
Computational analysis of cell walls
Layers of intertwined fibers make up plant cell walls. The various types of fibers respond differently to deformation. Cellulose microfibrils, for example, can stretch or curve, changing their end-to-end length, and can also slide past each other, reorient relative directions, and bundle with neighboring microfibrils. Zhang et al. developed a computational model based on observations of onion skin epidermis that describes how these complex changes in space govern cell wall mechanics. The results inform ways to engineer multifunctional fibrous materials. —PJH
Science, this issue p. 706

SUPERCONDUCTIVITY
Controlling interfacial superconductivity
The interface between the oxides LaAlO$_3$ and KTaO$_3$(111) has been shown to superconduct at temperatures up to 2 Kelvin. Chen et al. show that this superconductivity can be controlled with electric fields. As they tuned the gating voltage, the researchers observed a dome-shaped variation of the superconducting critical temperature. This variation could not be ascribed to the change in carrier density, but rather seemed to reflect the change in the mobility of the carriers. —JS
Science, this issue p. 721

DNA REPAIR
Costs of moving stem cells
Adult stem cells travel long distances to a wound to repair the damaged tissue. The potential cost of migration has been revealed in vitro studies of cancer cell lines, dendritic cells, and primary stem cells. If these cells have to squeeze into wounds, then this constriction may cause DNA damage. Sahu et al. show that adult stem cells in Schmidtea mediterranea, a highly regenerative planarian flatworm, accumulate DNA...
A steam-blast (phreatic) eruption from Mount Ontake, Japan

VOLCANOLOGY

A pre-eruptive fever

Determining when volcanoes will erupt is important but difficult and often relies on measuring seismicity or deformation. Girona et al. added surface heat to that list, suggesting that a thermal signal precedes eruption by years. The increase in surface heat is subtle and likely due to underground hydrothermal activity, but it also can be detected with satellite observations and may allow early detection for the eruption of different types of volcanoes. This could be particularly important for phreatic eruptions that often occur with little to no warning. —BG

NEURODEVELOPMENT

Building bridges in the brain

Some 200 million axons connect the right hemisphere to the left through the brain’s corpus callosum. A malformed or absent corpus callosum causes neurological or cognitive deficits. During development, astroglia build a substrate for axons to use in crossing the interhemispheric fissure. Signaling by Netrin 1 (NTN1) and its receptor, Deleted in Colorectal Carcinoma (DCC), guides axons to the midline. Morcom et al. show that NTN1 and DCC function even earlier to clear the path by regulating astroglial morphology and function. Without NTN1 and DCC function, astroglia that would normally build bridges across the interhemispheric fissure are unable to do so, and thus axons, no matter how well guided, struggle to build the corpus callosum. —PJH

ENZYME ENGINEERING

Risk and replacement

Much like the gears and chain of a well-used bicycle, a cell’s metabolic enzymes age and collect damage and occasionally suffer catastrophic failure related to use. The rate of replacement required to maintain cellular function is determined by a combination of factors and differs for each enzyme. Hanson et al. analyzed protein turnover in bacteria, yeast, and plants and found associations among replacement rate, abundance, and metabolic flux. Up to 50% of metabolic enzymes may undergo self-inflicted, irreversible damage. Studying how to minimize these reactions without reducing activity could yield better catalysts for synthetic biology. —MAF

AUTOIMMUNE DIVERSITY

Population-level lupus

Autoimmune diseases often show polygenic inheritance, making the identification of potential causal genetic variants difficult, especially across ancestrally divergent populations. Andreoletti et al. examined the transcriptomes of bulk immune cells from 120 systematic lupus erythematosus (SLE) patients of Asian and European ancestry. Disease-specific genetic signatures were revealed, as well as ancestrally associated differences in SLE molecular pathways and the role of gene expression variation in disease severity. Because SLE severity differs among populations, this study highlights the need to examine disease genetics in multiethnic cohorts for underlying differences and to explore the clinical treatment options for individuals of differing ancestries. —LMZ

MAGNETISM

A twist on the Ising model

The material CoNb2O6 contains loosely bound zigzag chains of magnetic cobalt ions and is considered to be a model system for the so-called one-dimensional transverse field Ising model (TFIM). In this iconic model of quantum criticality, a string of particles with spin ½ orders with all of the spins pointing in the same direction, this ferromagnetic state melts at a critical value of external transverse magnetic field. Morris et al. re-examined the applicability of this model to CoNb2O6 using time-domain terahertz spectroscopy and found that some of their results could not be explained by TFIM. Instead, the data fit what the authors dubbed a twisted Kitaev chain model, in which the Ising direction alternates along the chain. —JS
Nat. Phys. 10.1038/s41567-021-01208-0 (2021).

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