

and shows how mutations that weaken ACE2 binding are compensated for by mutations that make new interactions. —VV

*Science*, abn7760, this issue p. 760

## CORONAVIRUS

### Beta variant antibody responses

Several severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) variants of concern that either enhance infectivity or resist neutralization by sera from vaccinated or convalescent individuals have emerged. The variants Beta and Omicron in particular no longer bind many neutralizing antibodies that target the receptor-binding domain (RBD) of the SARS-CoV-2 spike protein. Reincke *et al.* isolated antibodies from Beta-infected patients and showed that although some bound both the Beta and the wild-type RBD, others were specific for Beta. Some of the Beta antibodies had genetic characteristics similar to wild-type antibodies that were sensitive to the Beta mutations. Whereas some antibodies appeared to use a noncanonical binding mode, others accommodated Beta mutations into known binding modes. This work provides insights for the design of next-generation vaccines and antibody therapeutics. —VV

*Science*, abm5835, this issue p. 782

## 2D MATERIALS

### Hiding in plain sight

Superconductivity observed in “twisted” bilayers of the two-dimensional (2D) material graphene requires the layers to be carefully stacked on top of each other at a very precise angle. Zhou *et al.* found superconductivity in the most common form of bilayer graphene, called Bernal, which does not require such precise manipulation (see the Perspective by Heikkilä). The researchers subjected the samples to an external electric field, but superconductivity emerged only after they also turned on an in-plane magnetic field. This unusual effect of a magnetic field, which normally acts to suppress

superconductivity, is suggestive of exotic, spin-triplet pairing in Bernal-stacked bilayer graphene. —JS

*Science*, abm8386, this issue p. 774  
see also abn9631, p. 719

## TRANSPLANTATION

### Expanding the lung transplantation donor pool

A major challenge in lung transplantation is the need for ABO blood group matching. Wang *et al.* used two enzymes, an *N*-acetylgalactosamine deacetylase and a galactosaminidase, to convert blood group A lungs to blood group O lungs during *ex vivo* lung perfusion. The authors demonstrated successful removal of blood group A antigen with no overt changes in lung health. In an *ex vivo* simulation of transplantation, the authors showed reduced antibody and complement deposition, suggesting that this technique may reduce antibody-mediated injury *in vivo*. —CSM

*Sci. Transl. Med.* **14**, eabm7190 (2022)

## CULTURAL HERITAGE

### Ecological methods for cultural history

Much of the narrative literature from the European Middle Ages has been lost because of manuscript physical degradation and destruction, including library fires. Kestemont *et al.* show that established methods from ecology for estimating the numbers of unseen species can be applied to abundance data representing cultural artifacts to estimate the losses that ancient cultural domains have sustained over the centuries. The authors obtained estimates that not only corroborate existing hypotheses from book history, but also reveal unexpected geographic differences that have thus far gone unnoticed. For example, insular literatures, such as those from Iceland and Ireland, combine a surprisingly strong cultural persistence with an elevated distributional evenness. —AMS

*Science*, abl7655, this issue p. 765.

## IN OTHER JOURNALS

Edited by Caroline Ash  
and Jesse Smith



Streaks caused by SpaceX's Starlink satellites mar an image of the night sky in Utah.

## OSTEOPOROSIS

### Improved healing of rare fractures

Bisphosphonate (BP) therapy reduces the risk of fractures associated with osteoporosis. However, long-term BP use is linked to the development of a rare type of thigh fracture called atypical femoral fracture (AFF). Surgery is often required for AFF, but delayed healing can lead to further complications. Zheng *et al.* undertook molecular analysis of AFF healing stages and developed a rat model of long-term BP therapy with features of human AFF. Supplementation with the neuropeptide calcitonin gene-related peptide (CGRP) improved fracture repair by reducing the amount of extracellular matrix deposited by fibroblasts at the fracture site. Fracture healing was also improved by using a biodegradable magnesium-based implant that stimulated CGRP synthesis and release. —PNK

*Mater. Today* **10.1016/j.mattod.2021.11.028** (2022).

## SOCIAL SCIENCES

### Remnants of historical redlining

The long reach of racial inequities, as reflected by disparities in education and job advancement, are beginning to be recognized. In the 1930s, some US cities were mapped based on investment potential. Colors indicated neighborhoods that were considered hazardous (red), deteriorating (yellow), or desirable (blue/green). These zones largely corresponded to the racial makeup for these regions as Black, “foreigners,” or White, respectively. Huang *et al.* found corresponding variations in levels of services, such as loans and insurance, provided to different colored regions in Baltimore. This practice, called “redlining,” which was instituted almost 100 years ago, even today affects health and mortality. Life expectancy from red and yellow areas of Baltimore is about 5 years shorter than in those categorized as green or blue. —BAP

*PLoS ONE* **17**, e0261028 (2022).

## LIGHT POLLUTION

### Starlink contaminates astronomical survey

Several satellite “megaconstellations” are planned or are being deployed, increasing the number of artificial objects in the low Earth orbit by orders of magnitude. These satellites reflect sunlight, thus polluting astronomical observations, particularly surveys performed during twilight (such as those used to search for potentially hazardous asteroids). Mróz *et al.* examined images from the Zwicky Transient Facility twilight survey, searching for streaks caused by SpaceX’s Starlink satellites. The rate of contamination increased from 0.5% in November 2019 to 18% in August 2021, as 1667 Starlink satellites were placed into orbit. The authors calculate that when the 12,000-satellite Starlink constellation is complete, “essentially all” twilight images will contain satellite trails. —KTS *Astrophys. J.* **924**, L30 (2022).

culminated in larger-scale herding. Herding allowed selective breeding, removal of males, milk harvesting, and consumption of adult meat. At Aşıklı Höyük, these developments were associated with social evolution involving organization of labor, settlement layout, and a not inconsiderable waste problem (maybe the dog’s ancestors were useful in reducing the bone piles?). —CA

*Proc. Natl. Acad. Sci. U.S.A.* **119**, e2110930119 (2022).

## ORGANIC CHEMISTRY

### Versatile allylation

Organic chemists often spend substantial amounts of time optimizing a catalyst to control the configuration of a single carbon center. Tunable control over all four configurations of two adjacent carbons is more challenging and has been realized in comparatively few cases. Chen *et al.* showcase how a structure-based regression technique, molecular field analysis, can help to achieve this aim in an allylation reaction. Specifically, they optimized chiral phosphoramidite ligands on iridium that, when paired with a second boron catalyst, can transform  $\alpha$ -allyl esters into branched  $\alpha$ -allyl acids with tunable configurations at both the  $\alpha$ - and  $\beta$ -carbons. —JSY

*Cell Rep. Phys. Sci.* **2**, 100679 (2021).

## GLYCOSYLATION

### A sweet panel of enzymes

Many potent plant natural products come attached to sugars that help to solubilize and stabilize those compounds until they are needed by the plant, often as a defense mechanism against herbivores or parasites. Zhang *et al.* analyzed a large family of glycosyltransferases, uncovering patterns of reactivity and selectivity. The authors identified a particularly promiscuous group of enzymes that may be a valuable resource for the engineering of plant natural product biosynthetic pathways and for biocatalysis. —MAF

*ACS Synth. Biol.* **10**, 1021/acsynbio.1c00489 (2022).

## METABOLISM

### Suppressing alcohol dependence

High alcohol consumption in humans is associated with variation in the genes encoding fibroblast growth factor 21 (FGF21) and its coreceptor  $\beta$ -klotho. FGF21 is a hormone that is produced from the liver in response to chronic and binge alcohol consumption, which can cross the blood–brain barrier and reduce alcohol preference in mice. Flippo *et al.* showed that a long-acting analog of FGF21 called PF-05231023 reduced alcohol consumption in mice and vervet monkeys, which will otherwise consume alcohol to intoxication. In mice, FGF21 induces excitation of  $\beta$ -klotho-expressing neurons in the basolateral amygdala, which are associated with consumption and reward-seeking behavior. Activation of the FGF21 axis might be a viable target to treat alcohol dependence in humans. —GKA

*Cell Metab.* **34**, 317 (2022).

## DOMESTICATION

### How sheep made it to the hearth

Aşıklı Höyük is a site in Anatolia showing exceptional preservation of 1000 years of Neolithic human history. The bone middens at this site offer a glimpse into one route for the domestication of

goats and sheep. Stiner *et al.* discovered that the first stages of domestication (about 10,400 years ago) involved catching wild kids and lambs for fattening at the settlement. This is a form of meat storage without spoilage for hunter-gatherers that evolved into small-scale breeding of animals at the homestead and



The bone middens found at Aşıklı Höyük, an archeological site in Turkey, reveal a unique history of sheep and goat domestication.

## In Other Journals

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