

antibodies, and then screened for binding to SARS-CoV-2. One of the affinity-matured progeny strongly neutralized SARS-CoV-2, SARS-CoV, and two SARS-related viruses from bats. In addition, this antibody bound to the receptor-binding domains from a panel of sarbecoviruses, suggesting broader activity, and provided protection against SARS-CoV and SARS-CoV-2 in mouse models. —VV  
*Science*, this issue p. 823

## CORONAVIRUS

### Mapping antibody escape in SARS-CoV-2

Several antibodies are in use or under development as therapies to treat COVID-19. As new severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) variants emerge, it is important to predict whether they will remain susceptible to antibody treatment. Starr *et al.* used a yeast library that covers all mutations to the SARS-CoV-2 receptor-binding domain that do not strongly disrupt binding to the host receptor (ACE2) and mapped how these mutations affect binding to three leading anti-SARS-CoV-2 antibodies. The maps identify mutations that escape antibody binding, including a single mutation that escapes both antibodies in the Regeneron antibody cocktail. Many of the mutations that escape single antibodies are circulating in the human population. —VV

*Science*, this issue p. 850

## MITORIBOSOME

### Making the energy makers

Within a mitochondrion, the powerhouse of eukaryotic cells, synthesis of the specialized transmembrane proteins of the electron transport chain is performed by dedicated mitoribosomes. The mechanism by which mitoribosomes couple protein synthesis with membrane insertion is poorly understood. Itoh *et al.* determined structures of the human mitoribosome

during nascent chain synthesis while bound to its membrane insertase. These structures revealed a series of coordinated conformational changes within the polypeptide exit tunnel. The gating mechanism offers a fundamental molecular insight into how membrane proteins are synthesized in human mitochondria. —DJ

*Science*, this issue p. 846

## PALEOENVIRONMENT

### Reversing the field

Do terrestrial geomagnetic field reversals have an effect on Earth's climate? Cooper *et al.* created a precisely dated radiocarbon record around the time of the Laschamps geomagnetic reversal about 41,000 years ago from the rings of New Zealand swamp kauri trees. This record reveals a substantial increase in the carbon-14 content of the atmosphere culminating during the period of weakening magnetic field strength preceding the polarity switch. The authors modeled the consequences of this event and concluded that the geomagnetic field minimum caused substantial changes in atmospheric ozone concentration that drove synchronous global climate and environmental shifts. —HJS

*Science*, this issue p. 811

## NEUROSCIENCE

### No ligand needed for learning

In addition to its role in stimulating appetite, the hormone ghrelin and its receptor, GHS-R1a, are implicated in cognition. Ribeiro *et al.* found a role for ghrelin-independent GHS-R1a signaling in learning in mice. Treating mice with an inverse agonist of GHS-R1a impaired spatial and contextual memory formation. Thus, the use of ghrelin receptor-blocking therapies, which have been proposed for treating metabolic disorders, acromegaly, cancer, and alcoholism, may also have cognitive side effects. —LKF

*Sci. Signal.* **14**, eabb1953 (2021).

## IN OTHER JOURNALS

Edited by Caroline Ash  
and Jesse Smith



## BEHAVIOR

### Free trade between species

The use of tokens as a bartering tool in nonhuman primate studies has taught us much about the willingness of nonhuman primates to engage in economic transactions. The question of whether it reflects a phenomenon that might emerge in natural conditions has received less attention. Long-tailed macaques (*Macaca fascicularis*) living in a Balinese temple regularly steal visitors' possessions and then barter for food with humans anxious to regain their belongings. Leca *et al.* discovered that they preferentially steal items of high value (for example, digital devices and wallets) over those with low value (for example, empty bags or hairpins) because higher-value food rewards tend to be offered for items that humans value more. The ability to identify high-value objects increases with age and experience, as does the macaques' skill as thieves. The animals in this group have been stealing and trading for more than 30 years, suggesting that the practice is culturally transmitted. —SNV  
*Philos. Trans. R. Soc. London Ser. B* **376**, 20190677 (2021).

Macaques have learned to barter for food with humans to return stolen possessions according to how highly an object is valued.



## CATALYSIS

### Caged hydrosilylation

Platinum-catalyzed hydrosilylation is applied at a vast scale to produce carbon-silicon bonds underlying certain stretchy polymers, lubricants, adhesives, and coatings. Pan *et al.* report that surrounding the platinum with a molecular cage can boost its activity and enhance its selectivity. Specifically, they used copper ions to template assembly of hexaphenylbenzene-based panels into a porous shell and then swapped out the copper for platinum. The caged catalyst was highly selective toward unencumbered carbon sites and also proved compatible with carbonyl and epoxide functionality. —JSY

*Nat. Commun.* 10.1038/s41467-020-20233-w (2021).

## REGENERATION

### Stem cells relieve pressure

In glaucoma, intraocular pressure damages innervation from the eye, resulting in irreversible blindness. The most common form of glaucoma is primary open-angle glaucoma (POAG), characterized by deterioration of the trabecular meshwork (TM) cells that encircles the base of the cornea. When Xiong *et al.* transplanted exogenous human trabecular meshwork stem cells (TMSCs) into a POAG mouse model, aqueous humor drained normally, intraocular pressure was reduced and the function of the retinal ganglion cells was preserved. TMSC transplantation also increased TM cellularity and promoted myocilin secretion, which reduced endoplasmic reticulum stress in the cells. These signs of TM tissue repair show promise for use of stem cells in the development of clinical treatments for glaucoma. —BAP

*eLife* 10, e63677 (2021).

## MICROBIOLOGY

### Wash in, wash out, repeat

Just as floods can temporarily displace human communities, intense rain periodically

brings disturbances to aquatic habitats. To study these cycles of disturbance and recovery, Shabarova *et al.* compared physical and chemical features with microbial community dynamics in Jiřická Pond in the Czech Republic. Water inflow from extreme rain events caused a rapid disturbance, including washout of larger microorganisms, influx of nutrients, and introduction of virus-like particles. However, four well-defined phases of succession returned the pond to its original state by about 2 weeks after the disturbance. —MAF

*Nat. Microbiol.* 10.1038/s41564-020-00852-1 (2021).

## EXOPLANETS

### A six-planet system with resonant orbits

Orbital migration during planet formation can produce resonant chains of orbits that are simple

multiples of each other. Studying such multiplanet systems provides information on the formation process. Leleu *et al.* used transit and radial velocity data to investigate a candidate multiple-planet system, TOI-178. They found six planets there, which had looked like three in the initial observations because some of the orbits were simple multiples of each other. Analysis of the extended dataset showed that five of the six planets are in a resonant chain. The planets are all between Earth and Neptune size and are on short orbits with high surface temperatures. —KTS

*Astron. Astrophys.* 10.1051/0004-6361/202039767 (2021).

## STRUCTURAL VIROLOGY

### A role for cholesterol in Ebola virus

The 2013–2016 Ebola epidemic in West Africa caused terrible

disease and more than 10,000 deaths. The only protein on the surface of this virus is the glycoprotein (GP), which comprises the GP1 and GP2 domains. After binding to a host protein, GP1 is unclamped from GP2, and GP2 initiates membrane fusion that implicates cholesterol. Lee *et al.* show that cholesterol interacts with glycine residues in the transmembrane domain of GP2. Mutation of a key glycine reduced membrane fusion using GP2 embedded in viral membrane surrogates and reduced cell entry of virus-like particles. Such particles produced from cells treated with cholesterol-lowering statins also showed impaired cell entry. Biophysical studies suggest that cholesterol affects the structure of GP2 and that this in turn may affect the efficiency of membrane fusion. —VV

*Nat. Struct. Mol. Biol.* 10.1038/s41594-020-00548-4 (2021).

## PARASITE GENOMES

### Moving genes through parasitism

Plants that parasitize other plants include species such as mistletoe and members of the endophytic family Rafflesiaceae, which have the largest flowers of any plant but no other recognizable external structures. The impact of extreme host dependency usually results in genome streamlining. Cai *et al.* assembled the genome of the parasitic *Rafflesia sapria himalayana*, hosts of which include members of the grape family. This parasite shows rapid genome evolution that has resulted in extensive gene loss in the chloroplast and photosynthetic machinery but retention of key genes for other organs. Unexpectedly, it has gained extensive repeat regions, resulting in a substantially larger genome than its closest free-living relatives, which may reflect horizontal gene transfer occurring during ancestral host associations. —LMZ *Curr. Biol.* 10.1016/j.cub.2020.12.045 (2021).

Flowering *Sapria himalayana*, which, despite being an endoparasite and completely dependent on its vine host, has a surprisingly large genome.



# Science

## Stem cells relieve pressure

Beverly A. Purnell

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DOI: 10.1126/science.371.6531.794-c

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