

built-in error detection, such a platform is promising for the development of scalable quantum networks. —ISO

Science, add9771, this issue p. 557; see also ade6964, p. 473

PLASMA CELLS

Long-lived plasma cell production

High-affinity antibodies that provide durable protective immunity are produced by long-lived bone marrow plasma cells that differentiate from germinal center (GC) B cells. However, the kinetics with which these plasma cells occupy survival niches in the bone marrow after immunization is poorly understood. Robinson *et al.* constructed a genetic time-stamping mouse model to mark plasma cells generated at specific stages of an immune response, which enabled them to track the fate of plasma cells over time. The formation of new long-lived plasma cells started early in the GC response after immunization and progressed at a linear rate. These findings suggest that vaccine formulations that can extend the duration of the GC response will boost the number of long-lived antigen-specific plasma cells generated after immunization. —IRW

Sci. Immunol. 7, eabm8389 (2022).

PHYSIOLOGY

Semaphorin 4D as cartilage destroyer

Various proinflammatory cytokines contribute to cartilage destruction in joint diseases. Murakami *et al.* found that the cytokine Semaphorin 4D (Sema4D) was released by inflamed macrophages and stimulated cartilage matrix degradation in articular chondrocytes and cartilage explants. In a mouse model of inflammatory arthritis, loss of Sema4D protected against cartilage degeneration. Sema4D stimulated the expression

of transcripts encoding matrix-degrading enzymes downstream of intracellular signaling pathways that were distinct from those by which Sema4D regulates cell morphology and motility. —AMV
Sci. Signal. 15, eabl5304 (2022).

VOLCANIC PLUMES

Reaching new heights

Large, explosive volcanic eruptions can loft material such as ash, gases, and water all the way into the stratosphere, with measurable impacts on atmospheric composition and climate. Proud *et al.* used geostationary satellite images of the January 2022 Hunga-Tonga volcano eruption, one of the largest eruptions ever recorded, to show that its volcanic cloud reached an altitude of 57 kilometers, well past the stratosphere and into the mesosphere and higher than any volcanic plume previously recorded. This is the first time a plume has been seen to penetrate the stratopause. —HJS

Science, abo4076, this issue p. 554

MONKEYPOX

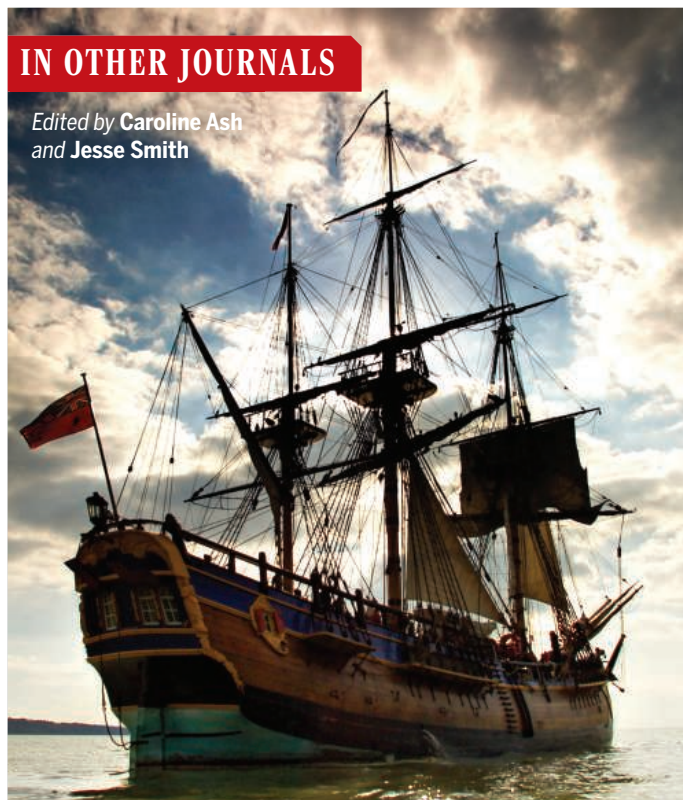
Deaminase drives viral evolution

Monkeypox cases have occurred sporadically around the world for several decades. However, May 2022 saw a surge of reports of monkeypox infections outside of endemic regions and concentrated in the community of men who have sex with men. Fortunately, modifications of the smallpox vaccine are effective against monkeypox. Gigante *et al.* identified two lineages occurring in the United States showing evidence of the antiviral activity of host apolipoprotein B editing complex (APOBEC3) cytosine deaminase. APOBEC3 editing is unusual for poxviruses, but it looks to be driving recent monkeypox virus evolution. —CA

Science, add4153, this issue p. 560

IN OTHER JOURNALS

Edited by Caroline Ash and Jesse Smith



BIOGEOGRAPHY

Imperial affiliations for alien flora

One legacy of empires is the alien plant life that was intentionally spread around the world by colonists, often for economic reasons. Some of these alien species have since become damagingly invasive, and floristic homogenization and ecosystem degradation have become widespread. Lenzner *et al.* used zeta diversity to capture the contribution of rare and widespread species to compositional similarity and turnover of a flora. Species turnover was determined largely by climate and modified by the length of time of colonization. Given its size and relatively recent expansion, the British empire has had the greatest influence on alien invaders. Despite increased global plant trade since World War II, the specific signatures of pre-war colonial power in a region can still be traced in the composition of its alien flora. —CA
Nat. Ecol. Evol. 10.1038/s41559-022-01865-1 (2022).

Captain James Cook's ship *Endeavour* (a modern replica of the barque is shown) carried the botanist Joseph Banks, who was a towering figure in plant collection and dispersal around the British empire.

EVOLUTION

Why are worms not afraid of cyanide?

Amygdalin, the Greek word for "almond," is a natural chemical compound found in many plants, including in the seeds of apples, peaches, cherries,

and almonds. Amygdalin is a cyanogenic glycoside that is poisonous to many animals, but bacteria and plants have enzymes that can detoxify cyanide. The nematode *Caenorhabditis elegans*, a tiny roundworm that, when it is not being used as a model

organism, normally lives in temperate soils and is able to tolerate amygdalin. Interestingly, this worm seems to have acquired resistance to the toxin by horizontal transfer of two genes, one of which encodes a detoxifying enzyme, from green algae. In nature, *C. elegans* lives within rotten fruit, where it likely encounters plant-derived cyanide. —DJ

Curr. Biol. 10.1016/j.cub.2022.09.041 (2022).

SOCIAL RELATIONSHIPS

Stay well together

Inflammation is thought to be an important neurobiological mediator between romantic emotions and physical vigor, but this connection is controversial. Jolink *et al.* measured blood levels of an inflammatory marker, C-reactive protein (CRP), in romantically attached couples. The authors confirmed that just being in the presence of the other partner affected systemic inflammation. Indeed, the more time (measured in minutes per 24 hours) spent within the same physical space

as the long-term partner, the lower the CRP levels recorded. Simply spending time together appears to be a good explanation for how high-quality relationships sustain physical health among adult humans by reducing systemic inflammation. —MM

Brain Behav. Immun. 107, 132 (2022).

QUANTUM KEYS

Chip-based quantum key distribution

The flow of information between sender and receiver is typically encrypted with secret keys to ensure privacy. With the development of quantum computers, however, it has been shown that classical encryption methods are susceptible to hacking. Quantum key distribution (QKD) is a provably robust method for ensuring security against such quantum hackers, but the generation and transmission of the quantum keys have been impractically slow. Beutal *et al.* present a chip-based, fully integrated four-channel wavelength-division

multiplexed QKD receiver that can achieve a key distribution of more than 12 megabits per second. Readily scalable by adding more wavelength channels, the architecture presents a viable route to developing secure, high-rate transmission of information across communication networks. —ISO

Optica 9, 1121 (2022).

SOCIAL SCIENCE

Political rallies can bias policing

Campaign rallies by Donald Trump influenced law enforcement behavior toward racial minorities for up to 2 months afterward. Grosjean *et al.* used data from 35 million US traffic stops from 2015 to 2017, including in 141 counties that hosted rallies. In these counties, there was a nearly 6% post-rally increase in the probability that a stopped driver was Black. This was not due to any changes in the behavior or racial composition of drivers. Effects were most pronounced among officers whose prior treatment

of Black versus white drivers was most biased. Among those officers, effects were exacerbated when rallies mentioned racial issues. —BW

Q. J. Econ. 10.1093/qje/qjac037 (2022).

FERROELECTRICS

The best way to relax

Relaxor ferroelectrics have both a polarization and a strain response to an external electric field, making them of great interest for various applications. However, the origin of this effect has been challenging to fully resolve. Kim *et al.* looked at the evolution of nanoscale polar nanodomains under varying epitaxial strains using diffused x-ray scattering, microdiffraction, electron microscopy, and molecular dynamics simulations. The authors found that structural transition between polar nanodomain configurations not only forms the basis for rotation of polarization but also for large electromechanical coupling. —BG

Nat. Phys. 10.1038/s41567-022-01773-y (2022).

Downloaded from <https://www.science.org> at University of North Carolina Chapel Hill on November 19, 2022

PLANT SCIENCE

Adaptive diversity

Insight into local adaptation of long-lived trees, which are often foundational species in their habitats, can aid restructuring of forest populations that have been overtaken by climate change. Capblancq *et al.* studied the interaction between distribution and genomic adaptation for the red spruce (*Picea rubens*), which is found from Nova Scotia to North Carolina, areas that include a range of precipitation, moisture, and temperature extremes. The authors found that red spruce seedlings grew more poorly the farther they were transplanted from the site and environmental conditions local to their mother tree because of genetic selection for local conditions. —PJH

New Phytol. 10.1111/nph.18465 (2022).

Red spruce grows along a wide latitudinal gradient in the eastern United States, across which it displays genomic adaptation for local conditions.

PHOTO: BLICKWINKEL/ALAMY STOCK PHOTO

In Other Journals

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