The International Seabed Authority is responsible for regulating deep-sea mining in the high seas. This agency has developed environmental management plans to protect local diversity by identifying areas where mining should be prohibited. Dunn *et al*. developed an ecological framework to identify criteria for establishing such mining-free regions on mid-ocean ridges. The areas should be at least 200 kilometers long to hold regional biodiversity intact. Furthermore, the species within these areas should be distributed properly to maintain population connectivity. —PJB

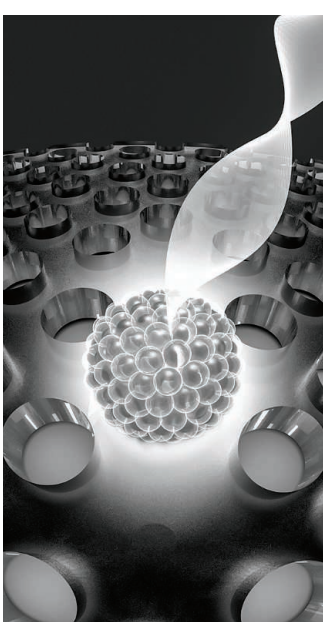
Sci. Adv. 10.1126/sciadv.aar4313 (2018).

QUANTUM OPTICS

A single-photon gate

A long-standing goal in optics is to produce a solid-state all-optical transistor, in which the transmission of light can be controlled by a single photon that acts as a gate or switch. Sun *et al*. used a solid-state system comprising a quantum dot embedded in a photonic crystal cavity to show that transmission through the cavity can be controlled with a single photon. The single photon is used to manipulate the occupation of electronic energy levels within the quantum dot, which in turn changes its optical properties. With the gate open, about 28 photons can get through the cavity on average, thus demonstrating single-photon switching and the gain for an optical transistor. —ISO

Science, this issue p. 57



The makings of a photon transistor

CREDITS: (FROM LEFT) S. SUN *ET AL*.; GOLFX/ISTOCKPHOTO

PREMATURE AGING

Delaying premature aging

Cells from patients with Hutchinson-Gilford progeria syndrome (HGPS) have defects in nuclear architecture that lead to premature cellular senescence. Larrieu *et al*. investigated the mechanisms by which a small molecule called remodelin improves the phenotype of HGPS cells (see the Focus by Wilson). Remodelin restored a nuclear import pathway mediated by Transportin-1 that was defective in HGPS cells, thereby delaying premature senescence. These results could also be applied to delay cellular senescence in cells derived from aged healthy individuals. —AV

Sci. Signal. **11**, eaar5401; see also eaat9448 (2018).

ATMOSPHERIC CIRCULATION

A traffic jam of air

Persistent meandering of the jet stream can cause atmospheric blocking of prevailing eastward winds and result in weather extremes such as heat waves in the midlatitudes. Nakamura and Huang interpret the poorly understood origins of these systems as the meteorological equivalents of traffic congestion on a highway and show how they can be described by analogous mathematical theory. Climate change may affect the frequency of blocking as well as its geographic distribution, reflecting a simultaneous shift in the structure of the stationary atmospheric waves and the regional capacity of the jet stream. —HJS

Science, this issue p. 42

IN OTHER JOURNALS

Edited by **Caroline Ash** *and* **Jesse Smith**

A coating inspired by shark skin can reduce the spread of bacteria from surfaces.

MICROBIOLOGY

Coatings join the fight against bacteria

Efforts to combat the spread of infections, especially in health care settings, mostly involve the use of antibacterial cleaning agents and antibiotic drugs. Another possible strategy is the use of coatings that are antibacterial (inactivating bacteria) or antifouling (preventing the build-up of bacteria) on surfaces such as doorknobs. Arisoy *et al.* report the development of such a coating with a structure inspired by shark skin. Bacterial attachment is reduced by 70% on the micropatterned, photocatalytic coating, compared with smooth films of the same composition. Most of the bacteria that do settle on the coating are inactivated when the coating is exposed to ultraviolet light. Because the coatings are imprinted onto a flexible substrate, it should be possible to use them in practical applications. —JFU

ACS Appl. Mater. Interfaces **10**, 20055 (2018).

DRUG DISCOVERY

Nanoscreening for drug combinations

Biological networks are complex, and effective therapies may require combinations of drugs to overcome redundancies, feedback mechanisms, or drug resistance. Such screening is challenging because of the multiplicity of combinations to test. Kulesa *et al*. describe a miniaturized process that automatically creates drug combinations

Police officers and demonstrators face off during the 2015 Baltimore protests.

PSYCHOLOGY

Online moral rhetoric and violent protests

Peaceful protests sometimes turn violent. To find out why, Mooijman *et al*. analyzed 18 million tweets sent during the 2015 Baltimore protests related to the death of Freddie Gray in police custody. They found that tweets expressing moral rhetoric predicted daily violence and police arrests in the hours after being sent. These data did not explore specific content or level of moral agreement in social networks. Follow-up vignette experiments and attitude surveys found that people endorse violent protest when they see an issue in moral terms and perceive that everyone agrees with them. These data have implications for understanding how online echo chambers may lead to violence and how to predict, and possibly prevent, the eruption of violence in social groups. —TSR

Nat. Hum. Behav. **2**, 389 (2018).

from nanoliter-scale droplets. Emulsions were made of a chemical compound, cell culture, and a fluorescent barcode. Pairs of droplets were loaded into wells of a microarray plate and mixed, and cell growth was monitored. This platform was successfully used to identify previously unsuspected drugs that synergize with antibiotics to kill *Escherichia coli*. —VV

Proc. Natl. Acad. Sci. U.S.A. 10.1073/pnas.1802233115 (2018).

NEUROINFLAMMATION

Joint pain impacts the brain

How does chronic peripheral inflammation affect the brain? In autoimmune disorders such as rheumatoid arthritis, joint inflammation is accompanied by fatigue and cognitive decline. Schrepf *et al*. have discovered that these symptoms are associated with changes in neural connectivity in specific brain regions. The authors used magnetic resonance imaging to examine 54 patients with rheumatoid arthritis over 6 months. Whole-brain searches and theoretical network analyses showed altered patterns of connectivity, with more positive connections involving the left inferior parietal lobule and the medial prefrontal cortex. These are the regions that function in attention and working memory. —LC

Nat. Commun. **9**, 2243 (2018).

CANCER

Aging and melanoma immunotherapy

Aging is a major risk factor for melanoma. Older patients are likely to develop more aggressive disease and usually respond poorly to treatment. Kugel *et al*. analyzed biopsies from melanoma patients and compared these samples with a murine model of disease. Unexpectedly, melanoma was less likely to progress in older patients and mice given pembrolizumab (an antibody therapy targeting the immune checkpoint regulator PD-1). The tumor microenvironments of older individuals were found to have fewer regulatory T cells (T_{regs}) that were positive for the marker FOXP3. Pembrolizumab was more effective in younger mice in which T_{regs} had been depleted by an antibody targeting CD25, indicating the possibility of a more effective therapeutic strategy for patients who respond poorly to anti-PD1 therapy. —MY

Clin. Cancer Res. 10.1158/1078-0432.CCR-18-1116 (2018).

AGING

Epigenetics, aging, and glycolysis

Aging brings reduced fitness and increased incidence of disease and death. Epigenetic changes are thought to be associated with various aging processes. By using CRISPR-Cas9 mutagenesis in the model fly, *Drosophila*, Ma *et al*. found that aging was associated with a loss of fidelity in histone modifications mediated by Polycomb proteins—specifically, a reduction in the repressive epigenetic mark called H3K27me2/3. If the Polycomb protein PRC2 was mutated, H3K27me2/3 was lost, glycolysis was elevated, and life span was restored. Transgenically increasing gene dosage for glycolytic enzymes also promoted life span, locomotion, and resistance to oxidative stress. —BAP

eLife 10.7554/eLife.35368 (2018).

ACADEMIC ENTREPRENEURS

Postprofessorial patents plummet

Curtailing academic inventors' rights to reap all benefits from their inventions and businesses—instead granting two-thirds of the rights to their university—can undermine university-based entrepreneurship and patenting. Hvide and Jones show that after Norway ended the so-called "professor's privilege" in 2003, the rate of university-based start-up company formation dropped by roughly 50%, and those start-ups exhibited less growth. The policy change, which moved Norway toward a U.S. Bayh-Dole model, also led to a roughly 50% drop in patenting, and the resulting patents received fewer citations. —BW

Amer. Econ. Rev. 10.1257/aer.20160284 (2018).

Nanoscreening for drug combinations

Valda Vinson

Science **361** (6397), 39-40.
DOI: 10.1126/science.361.6397.39-b