

satellites to show that wastewater injection caused surface deformation before the 2012 magnitude-4.8 Timpson earthquake in eastern Texas. Changes in subsurface pore pressure link injection to the surface deformation. Using satellites to track the impact of wastewater injection may improve earthquake forecasting in regions that are prone to induced seismicity. —BG

*Science*, this issue p. 1416

## HOST TOLERANCE Microbes teach tolerance in the gut

The trillions of microbes inhabiting and interacting in our gut can greatly influence how we respond to infection. Rangan *et al.* find that worms and mice harboring *Enterococcus faecium* in their guts can better tolerate *Salmonella* infections. Tolerance requires *E. faecium* to express the enzyme SagA, which can also exert a probiotic effect when expressed by other bacteria. SagA protects worms by cleaving bacterial peptide fragments so that they stimulate the tol-1 protein. In contrast, Pedicord *et al.* find that SagA protects mice against *Salmonella* and *Clostridium difficile* infections in a manner dependent on antimicrobial peptides and multiple innate immune receptors. —KLM

*Science*, this issue p. 1434;

*Sci. Immunol.* **1**, eaai7732 (2016).

## INFECTIOUS DISEASE Cultured guts combat gastroenteritis

Human noroviruses are highly contagious. They cause explosive outbreaks of gastrointestinal disease, which can be dangerous to the very young, the elderly, and the immunocompromised. Ettayebi *et al.* succeeded in growing several strains of noroviruses in human gut

Cultures of human gut stem cells enable the growth of norovirus strains in the laboratory.



stem cell cultures and found that the addition of bile substantially increased viral infectivity. This culture system will allow evaluation of new methods to inactivate human noroviruses for vaccine development and to determine the effectiveness of disinfectants and novel control measures. —CA

*Science*, this issue p. 1387

## NANOMATERIALS Rapidly reducing graphene oxide

The reduction of exfoliated graphene oxide platelets can produce graphene for applications in materials, energy storage, and catalysis. However, reduction methods often leave a substantial fraction of oxygenated functional groups in graphene, lowering its electrical conductivity. Voiry *et al.* report that brief microwave pulses (1 to 2 s) resulted in the near-complete reduction of graphene oxide. The resultant high-quality graphene, with high carrier mobility, served as a catalyst support with low overpotential for the oxygen reduction reaction. —PDS

*Science*, this issue p. 1413

## CONVERGENT EVOLUTION Genetic convergence to the extreme

Species in the same habitat may be only distantly related but yet share the need to adapt to environmental extremes. Yeaman *et al.* examined the underlying genetics of local environmental adaptation in lodgepole pine and interior spruce, which diverged over 140 million years ago (see the Perspective by Hancock). A suite of duplicated genes, which exhibited the hallmark of selection, were associated with cold tolerance in both species.

Adaptations to climate may therefore be genetically constrained, even among distantly related species. —LMZ

*Science*, this issue p. 1431; see also p. 1362

## IN OTHER JOURNALS

Edited by Sacha Vignieri and Jesse Smith

### DISEASE ECOLOGY

## No touching, please

European badgers have been blamed for the transmission of bovine tuberculosis in the United Kingdom and, despite much evidence to the contrary, have endured regular and repeated culling efforts based on the assumption that their lethal removal decreases the spread of the disease. Woodroffe *et al.* used GPS and contact collars to record the degree to which badgers and cattle actually come into contact. Despite finding that badgers prefer to spend their time in pastures, they recorded no direct contact between the two species, with badgers tending to stay at least 50 m from cattle. Thus, any transmission between these two species seems to be environmentally mediated, a result that could be instrumental in targeting nonlethal ways to prevent the spread of the disease. —SNV

*Ecol. Lett.* **10**, 1111/ele.12654 (2016).



European badgers avoid cattle in pastures, reducing bovine tuberculosis transmission routes.

### HOST RESPONSES

## An appetite for tolerance

The proverb “feed a cold, starve a fever” may contain a kernel of truth after all. Animals from insects to humans display

certain types of behaviors when they are sick, including reduced appetite and social withdrawal. To better understand the importance of these behaviors, Wang *et al.* studied the effects of sickness-induced anorexia in bacterially or virally

infected mice. They found that whereas nutritionally supplementing mice improved their overall survival of influenza infection or viral sepsis, it killed mice infected with *Listeria monocytogenes* or subjected to bacterial sepsis. These effects were independent of pathogen load and resulted rather from nutrition-based differences in the ability of the mice to tolerate the pathogen, owing to the different metabolic pressures facing the host. —KLM

*Cell* **166**, 1512 (2016).

### CELLULAR BIOCHEMISTRY

## Activating chromatin by stretching

Cells are subject to many mechanical stresses. These forces can profoundly alter cellular biochemistry. Tajik *et al.* used a magnetic bead on the surface of a cell to apply a shear stress to the cell's nucleus. A linear array of fluorophore-marked genes moved apart, indicating that their chromatin was being stretched. Stretching activates transcription of the marker genes within seconds, suggesting that the stretching effect, propagated through cytoskeletal tension, is direct, with the degree of stretching correlating with the degree of gene activation. —GR

*Nat. Mat.* **10**.1038/NMAT4729 (2016).

### QUANTUM OPTICS

## Toward quantum nanophotonics

The quantum properties of light are well studied and have been extensively used to reveal some of the fundamental aspects of quantum mechanics. Efforts now are under way to leverage the “quantum advantage” offered by quantum entanglement for practical applications such as enhanced imaging, sensing, and communications. A viable quantum technology, however, will require a shift from the optical bench to a miniaturized on-chip platform. Holtfrerich *et al.* show that the quantum

### FUTURE FAUNAS

## Global change and tropical birds

In much of the world, terrestrial organisms face the twin challenges of climate change and land use by humans. In a survey of a variety of tropical ecosystems in Costa Rica, Frishkoff *et al.* assessed the long-term responses of >300 native bird species to these challenges. Bird species from drier habitats showed greater ability to cope with the conversion of natural habitat to agriculture and with the drying trend in the region. Hence, these dry-habitat species are predicted to be relatively robust to future global change, whereas moist-habitat species may decline. The result will be a more homogenized and depleted fauna. —AMS

*Ecol. Lett.* **19**, 1081 (2016).

properties of optically entangled images are preserved as they are transmitted to distant plasmonic structures, where they convert to nanometer-scale electronic excitations before being converted back to light. —ISO

*Optica* **3**, 985 (2016).

### MATERIALS SCIENCE

## Stabilized dyes as dense glasses

The photostability of organic dyes can vary greatly between different crystalline polymorphs (packing arrangements), but similar effects have not been observed in amorphous or glassy materials. Qiu *et al.* studied the photostability of a common azobenzene dye (Disperse Orange 37), which can undergo photoisomerization, at different glass densities. Photostability was increased by a factor of 50 in glasses formed through physical vapor deposition on a substrate, relative to less dense glasses that formed simply by cooling the liquid. The highest photostability

was observed for the densest vapor-deposited glass, which formed at substrate temperature of 260 K. —PDS

*J. Am. Chem. Soc.* **10**.1021/jacs.6b06372 (2016).

### ROBOTICS

## Can you feel what I feel?

By combining tactile sensations of hardness, ductility, shape,

and surface texture, and then comparing these with our previous experiences, it is possible to safely grasp a random object placed in our hands without needing to see it. However, most robotic systems still lack this combination of abilities. Rather than focusing on better hardware, Sommer and Billard developed a control strategy for prioritizing the movement of

individual digits and feedback from sensors, while limiting the applied force and remaining within the limits of joint movement. This makes it possible to construct a multitouch hand that can adaptively grasp an object at several points at once and probe with some digits while gently holding an object with the others. —MSL

*Rob. Auton. Syst.* **10**.1016/j.robot.2016.08.007 (2016).



Strategically placed tactile sensors help a robotic hand grasp unknown objects while maintaining low contact forces.

Birds in drier tropical habitats may be more resistant to climate change and landscape alteration.



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PHOTOS (FROM TOP): ADRIAN HEPWORTH/ALAMY STOCK PHOTO; NICOLAS SOMMER, AUDE BILLARD, LASA EPEL

# Science

## No touching, please

Sacha Vignieri

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