antigenic targets that initiate disease are undefined. Planas *et al*. studied CD4$^+$ T cells from the cerebrospinal fluid of patients with multiple sclerosis. One CD4$^+$ T cell clone was reactive to the human enzyme guanosine diphosphate (GDP)–L-fucose synthase; T cells from other patients were then identified, as well as myelin-reactive cells. Intriguingly, some of the GDP-L-fucose synthase–reactive cells could also be stimulated by a bacterial version of the enzyme. These results identify an autoantigen and suggest that one possible trigger of disease could be cross-reactivity to microbiota-derived peptides. —LP

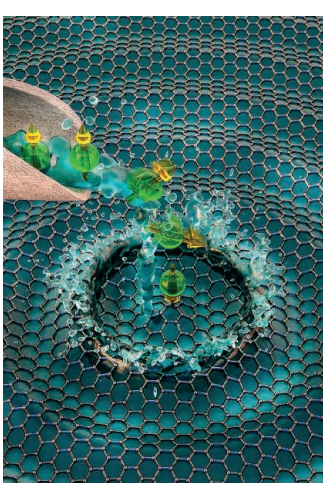
Sci. Transl. Med. **10**, eaat4301 (2018).

MAGNETISM

Magnons propagating in graphene

At sufficiently low temperatures, a two-dimensional electron system placed in an external magnetic field can exhibit the so-called quantum Hall effect. In this regime, a variety of magnetic phases may occur, depending on the electron density and other factors. Wei *et al*. studied the properties of these exotic magnetic phases in graphene. They generated magnons—the excitations of an ordered magnetic system—that were then absorbed by the sample, leaving a mark on its electrical conductance. The magnons were able to propagate across long distances through various magnetic phases in the bulk graphene. —JS

Science, this issue p. 229



Artist's view of magnon absorption by graphene

CREDITS: (LEFT) SECOND BAY STUDIOS; (RIGHT) EYE OF SCIENCE/SCIENCE SOURCE

VIROLOGY

Pathologizing *Staphylococcus*, fast

Bacteriophages are the main vehicle for gene swapping in bacteria, notoriously of pathogenicity islands and antibiotic resistance genes. Chen *et al*. noticed that the *Staphylococcus aureus* prophages do not excise from their host's genome until very late in their life cycles (see the Perspective by Davidson). Thus, the phage DNA is amplified while embedded in the bacterial chromosome. The resulting concatemers are processively packed into virus capsules while still integrated in the host chromosome. Each virion is only set loose when the capsule has reached physical capacity—a process called "headful" packaging. In situ amplification maximizes viral replication, and the headful mechanism means adjacent bacterial-host DNA also gets grabbed to fill the capsule. This process ensures that host genes are transmitted along with the phage. —CA

Science, this issue p. 207; see also p. 152

NANOMATERIALS

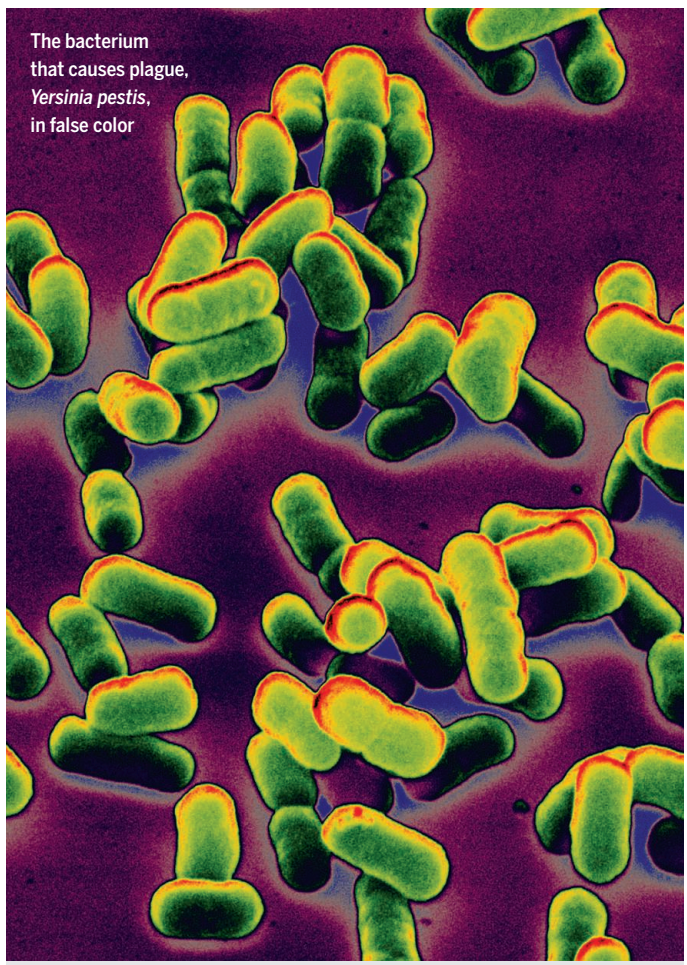
The twisted carbon nanotube story

Despite progress in growing single-walled carbon nanotubes of specific size and chirality, the factors that control their growth are still not fully known. Magnin *et al*. developed a thermodynamic model for the growth of single-walled carbon nanotubes. The model explains the origin of nanotube chirality in terms of the configurational entropy of the nanotube edge. The model should be useful in helping to guide nanotube growth parameters to enhance selectivity. —MSL

Science, this issue p. 212

IN OTHER JOURNALS

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



The bacterium that causes plague, *Yersinia pestis*, in false color

MICROBIOLOGY

Plague, one lymph node at a time

Swollen lymph nodes, or buboes, are the hallmark of plague, which is caused by the pathogen *Yersinia pestis*. Buboes result from a massive influx of immune cells into draining lymph nodes (DLNs). Recently, *Y. pestis* was shown to disseminate by carriage within immune cells migrating from one DLN to the next. Arifuzzaman *et al*. investigated how *Y. pestis* exploits the features of buboes to promote pathogenesis. Infiltration of infected monocytic cells into tightly packed buboes coincided with cytolysis triggered by *Yersinia* outer protein J, resulting in the release of intracellular bacteria and extensive infection of neighboring cells. The dying monocytic cells released sphingosine 1-phosphate (S1P), which attracted yet more cells, and up-regulated expression of the S1P receptor promoted the exit of newly infected monocytic cells from buboes. Preventing necrotic cell death protected mice from otherwise lethal infection. Thus, *Y. pestis* commandeers cell-death and immune-cell trafficking programs to convert the host's DLNs into specialized hubs for dissemination. —SMH

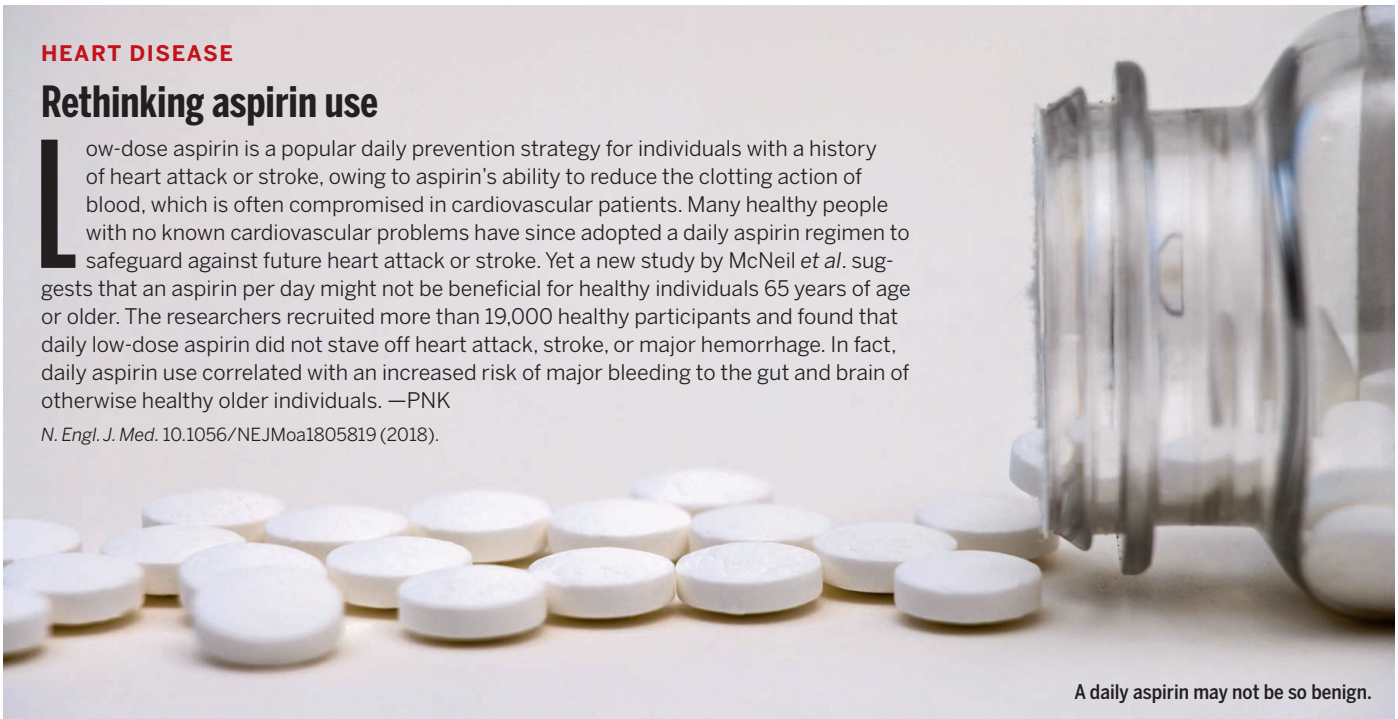
JCI Insight **3**, e122188 (2018).

HEART DISEASE

Rethinking aspirin use

Low-dose aspirin is a popular daily prevention strategy for individuals with a history of heart attack or stroke, owing to aspirin's ability to reduce the clotting action of blood, which is often compromised in cardiovascular patients. Many healthy people with no known cardiovascular problems have since adopted a daily aspirin regimen to safeguard against future heart attack or stroke. Yet a new study by McNeil *et al*. suggests that an aspirin per day might not be beneficial for healthy individuals 65 years of age or older. The researchers recruited more than 19,000 healthy participants and found that daily low-dose aspirin did not stave off heart attack, stroke, or major hemorrhage. In fact, daily aspirin use correlated with an increased risk of major bleeding to the gut and brain of otherwise healthy older individuals. —PNK

N. Engl. J. Med. 10.1056/NEJMoa1805819 (2018).



A daily aspirin may not be so benign.

SPINTRONICS

Making graphene useful for spintronics

Thanks to graphene's weak spin-orbit coupling, spin currents flow through it unimpeded. However, this also means that the spin currents are hard to manipulate—a drawback for using graphene in spintronics. Two groups now show that this needn't be the case. Leutenantsmeyer *et al*. and Xu *et al*. studied spin transport in heterostructures of bilayer graphene with hexagonal boron nitride. In the presence of an electric field, the spin lifetimes in the directions parallel to the heterostructural layers and perpendicular to them were markedly different. The long and anisotropic lifetimes may lead to useful spintronics applications. —JS

Phys. Rev. Lett. **121**, 127702, 127703 (2018).

CARBON CYCLE

Deciphering atmospheric CO_2 change

Many different processes and carbon sources can affect the concentration of atmospheric carbon dioxide (CO_2), so to understand past, present, and likely future variability of CO_2, those mechanisms and reservoirs must be identified. Bauska *et al*. present a record of the stable carbon isotopic composition of CO_2 over the interval between 50,000 and 35,000 years ago, which reveals that the primary source of atmospheric carbon during millennial-duration events probably was organic carbon residing in the deep ocean, whereas more abrupt events occurring over centennial time scales were associated both with hydrological change in the tropics and rapid increases in Northern Hemisphere temperature. —HJS

Geophys. Res. Lett. **45**, 7731 (2018).

PROTEIN DESIGN

Learning from diminutive ligand design

One strategy for understanding the origin of life is proposing simple replacements for the complex biomolecules that have developed through billions of years of evolution. Ferredoxins are small proteins that contain simple, cubic clusters of iron and sulfur atoms and act as mobile electron carriers in cells. Kim *et al*. designed a 12-residue peptide with alternating D and L amino acids that can replicate the placement of cysteine ligands found in many natural ferredoxins. After reconstitution with iron and sulfur, the peptides bound a single iron-sulfur cluster. The resulting minimal, artificial ferredoxin exhibited a redox potential compatible with some biological processes. —MAF

J. Am. Chem. Soc. **140**, 11210 (2018).

MICROBIOTA

The long reach of the gut

How does the gut microbiota shape the composition and function of distal host organs, despite being segregated in the gut? Uchimura *et al*. used stable isotope tracing to show that microbial metabolites penetrate host tissues and fluids to influence host immunological and metabolic signaling networks. However, metabolite impact is modulated by a high rate of urinary excretion of microbial products. Furthermore, secretory immunoglobulin A antibodies limit bacterial dwell times in the small intestine, which also ameliorates host exposure to microbial metabolites. The joint effect contributes to resolving gut function as both nutrient gateway and barrier. —STS

Immunity **49**, 545 (2018).

NEUROSCIENCE

Memory recirculation and integration

Hippocampal pattern separation minimizes interference between experiences and is critical to episodic memory (a person's collection of memories of an event). However, the hippocampus is also critical for the integration of information across episodes. These two roles are apparently in conflict. Using high-resolution brain scanning, Koster *et al*. investigated information flow through the layers of the entorhinal cortex that are the inputs and outputs of the hippocampus. Rather than the output of the system being the end product of hippocampal processing, it is recirculated as a new input. This result indicates big-loop recurrence, predicted by computational theories, which states that episodic memory and the integration of information across experiences need not conflict. —PRS

Neuron **99**, 1342 (2018).