

## ANTIBIOTICS

**Countering TB prodrug resistance**

The arsenal of antibiotics for treating tuberculosis (TB) contains many prodrugs, such as ethionamide, which need activation by normal metabolism to release their toxic effects. Ethionamide is potentiated by small molecules. Blondiaux *et al.* screened for more potent analogs and identified a lead compound called SMART-420. This small molecule inactivates a TetR-like repressor, EthR2, and boosts ethionamide activation. SMART-420 successfully promoted clearance of multidrug-resistant strains of *Mycobacterium tuberculosis* from the lungs of mice. —CA

*Science*, this issue p. 1206

## DIAGNOSTICS

**Finding the right blood type**

Blood type matching is important for pregnancy, blood transfusion, and bone marrow transplantation. Zhang *et al.* developed a blood typing assay based on color changes assisted by a common pH indicator dye. Red blood cells (RBCs) and plasma were separated from small blood samples by using antibodies



A traditional blood typing assay

immobilized on paper test strips. The assays allowed forward grouping (detecting anti-A and/or anti-B antigens on RBCs) and reverse grouping (monitoring agglutination between RBCs and anti-A and/or anti-B antibodies in plasma) within 2 min. The test could also perform Rh and rare blood typing. This economical and robust assay will be useful in time- and resource-limited environments. —CC

*Sci. Transl. Med.* **9**, eaaf9209 (2017).

## INFECTION

**The parasite of my parasite is my friend?**

Virulence factors of pathogenic bacteria can be swapped by means of bacterial viruses called phages. In turn, the pathogenic bacteria are under attack by the hosts' immune responses. Diard *et al.* discovered that SopE $\phi$ , a phage parasite of pathogenic *Salmonella* species, is encouraged to spread between bacteria by the mouse host's inflammatory responses. Conversely, mucosal vaccination against *Salmonella* reduced inflammatory responses and curbed the transfer of SopE $\phi$  to naïve bacteria. —CA

*Science*, this issue p. 1211

## WEARABLE TECHNOLOGY

**Sensing touch without touching**

Electronic devices that can be integrated into clothing or worn on skin will provide wearable approaches for monitoring human health or motion. Success depends on the development of bendable, stretchable sensors that respond to touch. Sarwar *et al.* developed sensors based on conductive hydrogel polymer electrodes embedded in a flexible polymer framework. The sensors responded to touch, even when bent or stretched, and were also able to sense an approaching finger. The low-cost, easily manufactured sensors could accelerate the adoption of wearable technology. —LA

*Sci. Adv.* **10**, 1126. sciadv.1602200 (2017).

## IN OTHER JOURNALS

Edited by **Sacha Vignieri**  
and **Jesse Smith**

## AGRICULTURE

**Remote sensing for analyzing smallholder farm yields**

**S**mallholder farmers are key to local food security, but their productivity, or lack thereof, is buried when agricultural statistics are discussed at the scale of regions and nations. Household surveys are hampered by errors in self-reporting, and on-the-ground field surveys are constrained by limited personnel. Burke and Lobell combined high-resolution satellite imagery (at the scale of 1 m) with ground-truthed data to estimate yields from maize agriculture in western Kenya, where many of the fields are less than half an acre in size and irregularly shaped. Measurements of canopy greenness captured evidence of nutrient deficiencies. Productivity differed by as much as threefold even between neighboring plots, suggesting opportunities for yield improvement through changes in field management. —PJH

*Proc. Natl. Acad. Sci. U.S.A.* **10**, 1073/pnas.1616919114 (2017).

Remotely sensed estimates of nutrient value reveal differences among local farms in Kenya.

## GEOPHYSICS

**Sand-driven magnetic field**

Earth's magnetic field is due to convection of its liquid iron-nickel core, which also contains an unknown amount of lighter elements such as silicon, oxygen, and sulfur. Hirose *et al.* performed experiments that show that silica unexpectedly crystallizes out of a liquid iron alloy at high pressures and temperatures. This discovery identifies a source of compositional buoyancy that would have driven the convection needed for a magnetic field very far back in Earth's history. It also sets a limit on how much silicon and oxygen remain in the outer core today. —BG

*Nature* **10**, 1038/nature21367 (2017).

## PSYCHOLOGY

**Microaggression actions outpace evidence**

Efforts to combat prejudice in workplaces and on campuses

by targeting microaggressions lack solid foundations in psychological research. Lilienfeld, who supports microaggression research, surveyed evidence and identified 18 research priorities—for example, better define what is not a microaggression, and do not confound the frequency of microaggressions with the subjective distress that they evoke. He suggests tempering assertions about causal links between microaggressions and adverse mental health and proposes a moratorium on intervention programs that may create more problems than they solve. —BW

*Perspect. Psychol. Sci.*

**10**, 1177/1745691616659391 (2017).

## MALARIA

**Softening up your target**

During infection, malaria parasites must invade erythrocytes. Erythrocytes are flexible cells that can easily deform to make it through the tight spaces of the vasculature, but they are nevertheless fortified by a



has been implicated in neuropsychiatric conditions such as autism spectrum disorder. Ripamonti *et al.* looked deeper and discovered that a surge of maternal oxytocin right before childbirth is required for the priming of excitatory hippocampal neurons, which are typically involved in memory formation and anxiety regulation. In this process, oxytocin regulates dendritic branching, synapse formation, and synaptic transmission, allowing for the synchronicity of the neuronal network. Without this, the balance of excitatory and inhibitory signals is disrupted, which can lead to neurobehavioral disorders. —MKE  
*eLife* 10.7554/eLife.22466 (2017).

### NEUROSCIENCE

## Fine-scale structure in higher brain areas

The prefrontal cortex of the brain is involved in higher-order cognitive processes, including attention, decision-making, and goal-directed action. At present, we do not know how abstract context is represented in the prefrontal cortex, whether there are subregions, and, if so, how they might be organized. Waskom and Wagner used high-resolution brain scanning while subjects performed tasks that demanded goal-directed behavior. Multivariate signal-decoding techniques and examination of spontaneous activity correlations demonstrated the existence of stable networks of subregions within this brain area. Abstract cognitive representations thus emerge from an intrinsic functional organization in the human prefrontal cortex. —PRS

*Proc. Natl. Acad. Sci. U.S.A.* **114**, 230 (2017).

membrane-associated, spectrin-based cytoskeleton. Sisquella *et al.* examined the invasion process to see how the parasite manages to gain access to the erythrocyte cytoplasm. They found that early interactions between the parasite and the erythrocyte increase the local deformability of the erythrocyte membrane, promoting invasion. The parasite triggers a signaling cascade within the erythrocyte that “loosens up” its cytoskeleton. Blocking this signaling inhibited the ability of the parasites to invade. —SMH  
*eLife* 10.7554/eLife.21083 (2017).

3R phase has a three-layer ABC repeat and different electronic properties because it is noncentrosymmetric. Shearer *et al.* grew WSe<sub>2</sub> nanoplates through chemical vapor deposition that had screw dislocations. A triangular dislocation grew noncentrosymmetric layers, a hexagonal dislocation grew centrosymmetric layers, and mixed dislocations grew weakly noncentrosymmetric layers. They explored the changes in properties with stacking, such as strong second-harmonic

generation with the noncentrosymmetric material. —PDS  
*J. Am. Chem. Soc.* 10.1021/jacs.6b12559 (2017).

### NEURODEVELOPMENT

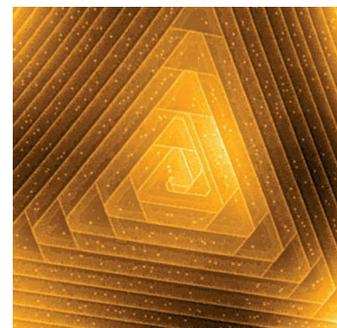
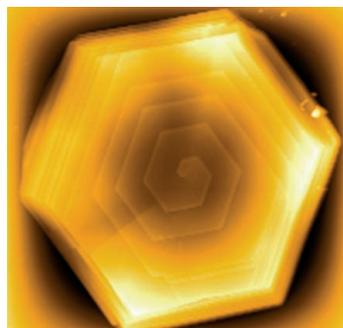
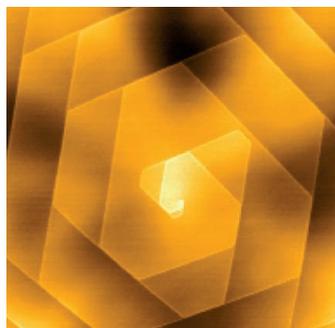
## Love hormones and mental health

Oxytocin, also known as the love hormone, plays vital roles in childbirth and social bonding. It is also crucial in aiding the correct wiring of certain neuronal circuits in the brain during development, and altered oxytocin signaling

### NANOMATERIALS

## Restacking the deck

The properties of two-dimensional sheets of layered transition metal dichalcogenides such as tungsten diselenide (WSe<sub>2</sub>) depend on how the layers stack. For example, the more common 2H phase has a two-layer AB repeat and is centrosymmetric, but the rare



Screw dislocations affect the geometry of WSe<sub>2</sub> nanoplates.