

The device was packaged for point-of-care use—including its own smartphone “app”—and successfully diagnosed *Loa*-infected people in Cameroon, Africa. — MLF

Sci. Transl. Med. **7**, 286re4 (2015).

OPTOGENETICS

An optogenetic tool to silence neurons

Potassium channels in the cell membrane open and close in response to molecular signals to alter the local membrane potential. Cosentino *et al.* linked a light-responsive module to the pore of a potassium channel to build a genetically encoded channel called BLINK1 that is closed in the dark and opens in response to low doses of blue light. Zebrafish embryos expressing BLINK1 in their neurons changed their behavior in response to blue light. — VV

Science, this issue p. 707

VACCINES

Extra dividends from measles vaccine

Vaccination against measles has many benefits, not only lifelong protection against this potentially serious virus. Mina *et al.* analyzed data collected since mass vaccination began in high-income countries when measles was common. Measles vaccination is associated with less mortality from other childhood infections. Measles is known to cause transient immunosuppression, but close inspection of the mortality data suggests that it disables immune memory for 2 to 3 years. Vaccination thus does

more than safeguard children against measles; it also stops other infections taking advantage of measles-induced immune damage. — CA

Science, this issue p. 694

TISSUE REGENERATION

Inhibiting Hippo to mend broken hearts

Activation of the Hippo signaling pathway prevents organ overgrowth. The pathway inhibits the activity of the transcriptional coactivator Yap, which is important during development. However, this same activity limits the ability of some organs to regenerate after injury. Morikawa *et al.* found that Yap target genes not only included cell cycle genes but also genes encoding cytoskeletal remodeling proteins or proteins that link the cytoskeleton to the extracellular matrix. Cardiomyocytes from Hippo signaling-deficient mice formed cellular protrusions typical of migrating cells and more readily moved toward scar sites after cardiac injury. Thus, inhibiting the Hippo pathway could help with heart regeneration. — WW

Sci. Signal. **8**, ra41 (2015).

MALARIA

A way to dissect malaria's secrets

Malaria has exerted a strong selective force on the human genome. However, efforts to identify host susceptibility factors have been hindered by the absence of a nucleus in red blood cells. Egan *et al.* developed an approach involving blood stem cells

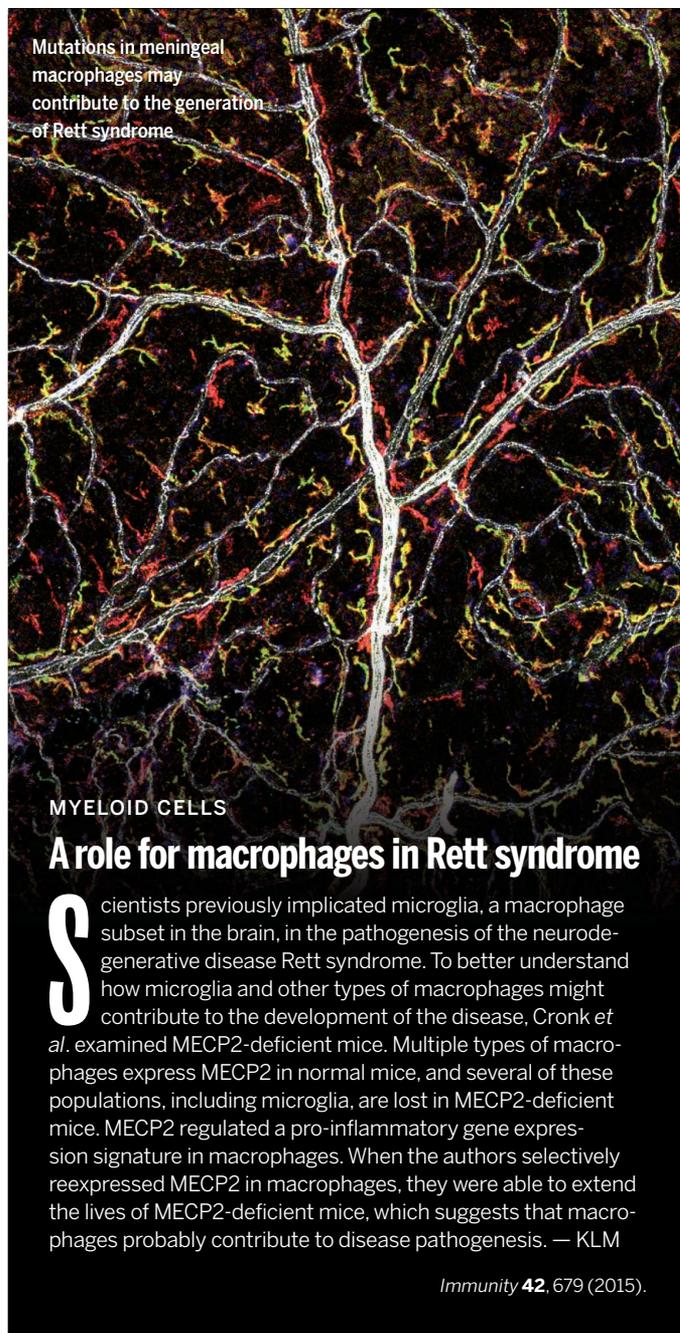
to discover host factors critical for *Plasmodium falciparum* infection of red blood cells. The authors identified an essential host receptor for parasite invasion that could provide a target for malaria therapeutics. — SMH

Science, this issue p. 711

IN OTHER JOURNALS

Edited by Sacha Vignieri and Jesse Smith

Mutations in meningeal macrophages may contribute to the generation of Rett syndrome



MYELOID CELLS

A role for macrophages in Rett syndrome

Scientists previously implicated microglia, a macrophage subset in the brain, in the pathogenesis of the neurodegenerative disease Rett syndrome. To better understand how microglia and other types of macrophages might contribute to the development of the disease, Cronk *et al.* examined MECP2-deficient mice. Multiple types of macrophages express MECP2 in normal mice, and several of these populations, including microglia, are lost in MECP2-deficient mice. MECP2 regulated a pro-inflammatory gene expression signature in macrophages. When the authors selectively reexpressed MECP2 in macrophages, they were able to extend the lives of MECP2-deficient mice, which suggests that macrophages probably contribute to disease pathogenesis. — KLM

Immunity **42**, 679 (2015).

PROTEIN BINDING

Methyl-C binding may explain Rett late onset

Girls with Rett syndrome develop normally for the first 1 or 2 years of life before suffering from progressive neurological problems, perhaps due to mutations in methyl-CpG-binding protein 2 (MeCP2). Chen *et al.*

analyzed the binding of MeCP2 to genomic DNA in the mouse brain and found that before birth, MeCP2 binds predominantly to methylated CG sequences. After birth, there is an increase in the genome of methylated C in a non-CG context (mCH). MeCP2 binds to many of these mCH sites, which are enriched in genes with neuronal functions. MeCP2



Measles vaccination

ECOLOGY

Thirty new fly species in Los Angeles

Urban environments are not usually considered to be rich in biodiversity; surveys of urban biodiversity often report limited and declining numbers of species. Hartop *et al.* show that they can nevertheless yield surprises, at least when it comes to insect diversity. Studying thousands of samples from private backyards in Los Angeles, CA, the authors have discovered 30 previously unknown species of *Megaselia* flies. Possible reasons for this unexpected diversity may be the wide range of geography in the Los Angeles area and the introduction of invasive species via its large container ports. It remains unclear, however, whether this diversity represents native or invasive species. — JFU

Zootaxa 10.11646/zootaxa.3941.4.1 (2015).

Six of 30 new fly species discovered in Los Angeles



binding modulates the transcription of these genes, some of which are implicated in Rett syndrome, potentially explaining the late onset of the disease. — GR

Proc. Natl. Acad. Sci. U.S.A. doi/10.1073/pnas.1505909112 (2015).

NEUROSCIENCE

Sleeping while awake

Sleep deprivation affects our behavior and performance. Bernardi *et al.* demonstrate the connection between task-specific performance decrease and local sleep in relevant parts of the human brain. During 24 hours of wakefulness, individuals participated in driving simulations and executive function exercises. Their task-related abilities, such as visuomotor control and response inhibition, were tested

alongside electroencephalography (EEG) recordings and functional magnetic resonance imaging (fMRI). Local EEG theta waves, normally observed during sleep, coincided with times of slower movements, visual inaccuracies, and decreased impulse control. The fMRI scans exposed cognitive fatigue in the form of regional neuronal disconnections in the task-relevant brain areas in addition to the general deficiencies. — MSM

J. Neurosci. **35**, 4487 (2015)

PHYSICS

Tilting the field to expose a fraction

In extremely clean, flat, and cold conductors, turning on an external magnetic field can produce

the so-called quantum Hall effect (QHE), with the voltage across the sample exhibiting plateaus. The plateaus reflect the discrete energy levels of electrons in a magnetic field and can sometimes appear when only part of the level is filled: the fractional QHE. The most exotic of these states have filling factors with even denominators and may be useful in topological quantum computing. Falson *et al.* observed even-denominator states with filling factors $3/2$ and $7/2$ at the interface of MgZnO and ZnO. Interestingly, one of the states was only observable when the researchers tilted the magnetic field from the normal to the sample. — JS

Nat. Phys. **11**, 347 (2015).

MEDICINAL CHEMISTRY

Proteins take steps to bind larger ligands

In medicinal chemistry, optimizing the binding of a small molecule to a protein target often involves incremental changes to the small molecule. The design process may involve simulations of how a series of molecules binds to the target, but there is little experimental data to inform this analysis. Merski *et al.* determined the structures of eight benzene compounds, each differing by a single methyl group, binding to the model protein T4 lysozyme. Instead of gradually changing structure, T4 lysozyme transitions between three conformations with different-sized ligand-binding sites. A search of the protein data bank revealed other examples of discrete changes in response to ligand size. Modeling such discrete conformations may be important in drug design. — VV

Proc. Natl. Acad. Sci. U.S.A. 10.1073/pnas.1500806112 (2015).

FLOW CHEMISTRY

Round and round with a precious catalyst

When manufacturing pharmaceuticals, it is crucial to make just one of two possible mirror-image structures. Soluble precious metal catalysts can facilitate that objective, but they're often hard to collect and reuse after the reaction is over. O'Neal *et al.* present a laboratory-scale flow and filtration protocol to keep a ruthenium hydrogenation catalyst in continuous use for 24 hours. A membrane incorporated into the flow apparatus retains the catalyst in the reaction loop while releasing the product, all the while withstanding hydrogen pressure and a strongly basic co-catalyst. Less than 200 parts per billion of ruthenium escapes into the product stream. — JSY

ACS Catal. **5**, 2615 (2015).

Science

Thirty new fly species in Los Angeles

Julia Fahrenkamp-Uppenbrink

Science **348** (6235), 645-646.
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