

resulted in the mutation of every single PERV reverse transcriptase gene. This prevented replication of all copies of PERV, viral infection, and transmission to human cells. — GR

*Science*, this issue p. 1101

## MALARIA

### How malaria parasites infect the liver

Early in infection, malaria parasites establish themselves within hepatocytes in the liver. Inside these cells, the parasites occupy a so-called parasitophorous vacuole. Kaushansky *et al.* show that malaria parasites prefer to create vacuoles within hepatocytes that express the EphA2 receptor. Hepatocytes with low levels of this receptor were less conducive to malaria infection. — SMH

*Science*, this issue p. 1089

## ECONOMICS

### Predicting unmeasurable wealth

In developing countries, collecting data on basic economic quantities, such as wealth and income, is costly, time-consuming, and unreliable. Taking advantage of the ubiquity of mobile phones in Rwanda, Blumenstock *et al.* mapped mobile phone metadata inputs to individual phone subscriber wealth. They applied the model to predict wealth throughout Rwanda and show that the predictions matched well with those from detailed boots-on-the-ground surveys of the population. — GJC

*Science*, this issue p. 1073

## NANOMATERIALS

### Brighter molybdenum layers

The confined layers of molybdenum disulphide ( $\text{MoS}_2$ ) exhibit photoluminescence that is attractive for optoelectronic applications. In practice, efficiencies are low, presumably because defects trap excitons before they can recombine and radiate light. Amani *et al.* show

that treatment of monolayer  $\text{MoS}_2$  with a nonoxidizing organic superacid, bis(trifluoromethane) sulfonimide, increased luminescence efficiency in excess of 95%. The enhancement mechanism may be related to the shielding of defects, such as sulfur vacancies. — PDS

*Science*, this issue p. 1065

## PHOTOPHYSICS

### Charge separation viewed in reflection

When light strikes a semiconductor, excited electrons travel across the interface. Y. Yang *et al.* applied ultrafast reflection spectroscopy to probe this process in a gallium indium phosphide system used for hydrogen generation from water (see the Perspective by Hansen *et al.*). Platinum and titanium dioxide ( $\text{TiO}_2$ ) coatings enhanced charge separation of the excited electrons from the positive holes they left behind.  $\text{TiO}_2$ , however, was more effective at suppressing the reverse process of unproductive recombination. — JSY

*Science*, this issue p. 1061; see also p. 1030

## DIABETES IMMUNOTHERAPY

### Tweaking T regulatory affairs

In patients with type 1 diabetes (T1D), immune cells destroy the insulin-producing beta cells of the pancreas. Consequent prolonged exposure to high blood sugar can damage organs and lead to heart disease and kidney failure. Regulatory T cells ( $T_{\text{regs}}$ ) are known to be defective in autoimmune diseases, such as type 1 diabetes. Bluestone *et al.* report a phase 1 trial of adoptive  $T_{\text{reg}}$  immunotherapy to repair or replace these cells in type 1 diabetics. The cultured  $T_{\text{regs}}$  were long-lived after transfer and retained a broad  $T_{\text{reg}}$  phenotype. Moreover, the trial showed that transfer therapy was safe, endorsing efficacy testing in further trials. — ACC

*Sci. Transl. Med.* **7**, 315ra189 (2015).

## IN OTHER JOURNALS

Edited by Sacha Vignieri and Jesse Smith



Species with more neurons, such as this Gelada baboon, may need less sleep

## NEUROSCIENCE

### More neurons mean less need for sleep

Sleep is seemingly universal among animals. Daily sleep time varies considerably between mammalian species and also during mammalian development, yet we still don't know what drives this variation. Herculano-Houzel hypothesized that sleep-inducing metabolites produced during waking hours accumulate more slowly in brains that have a smaller density of neurons underneath a unit surface area that gets washed by cerebrospinal fluid during waking. In 24 mammalian species and several postnatal stages in the developing rat, there was indeed a correlation between the ratio of neuronal density to brain surface area and daily sleep duration. The evolutionary addition of neurons may have decreased the need for sleep, allowing a species to feed for longer, and thus facilitated further increases in neuronal numbers. — PRS

*Proc. R. Soc. London Ser. B* **282**, 1816 (2015).

## WORKFORCE DIVERSITY

### Diversity through ADVANCEment

The NSF ADVANCE program aims to increase the advancement of women in academic

careers, usually through the implementation of work/life support policies. Tower and Dilks developed a policy rating scheme to measure the level of parental leave, tenure clock extension, availability of child

care, and related support programs at 124 ADVANCE institutions. Results showed that ADVANCE universities were highly progressive regarding new parent support (80% offer benefits beyond FMLA protections to birth mothers) and basic child care (only 8% had no direct benefits). Additionally, a 1-year extension of the tenure clock was available to birth mothers at 44% of the institutions. As promising as these results seem, the authors caution that simply having work/life policies on the books is not enough to ensure their use. — MM

*J. Divers. High. Educ.* **8**, 157 (2015).

## PLANT SCIENCE

### Cell size matters to meristems

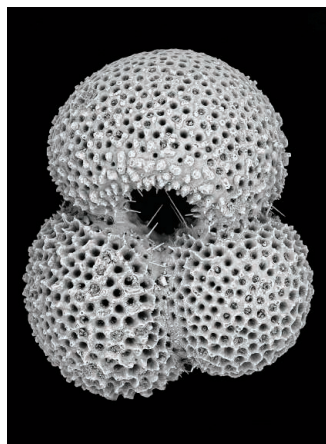
In the meristem that generates flowers for the plant *Arabidopsis thaliana*, the cells are all generally the same size. Serrano-Mislata *et al.* asked what happens when that regularity is perturbed. Some irregularity occurs naturally, as cell divisions were often a bit unequal, producing daughters of different sizes. Experimental manipulation of cell cycle progression introduced other irregularities. Persistent disruption of cell-size controls correlated with irregular or absent definition of the floral organs generated by the meristem. Regardless of how the irregularities were generated, the meristem corrected size irregularities and brought daughter cells into the same regularized size. The authors hypothesize that without a controlled unit size, the signaling that establishes developmental fates in the meristem becomes scrambled and vague. — PJH

*Curr. Biol.* **25**, 1 (2015).

## PALEOCLIMATE

### A shifting wet girdle around the tropics

The Intertropical Convergence Zone (ITCZ) causes heavy rains



A fossil *Globigerinoides ruber*, used to reconstruct past precipitation changes

to fall in a seasonally migrating band around the globe near the equator. Because it delivers so much precipitation to so many regions, it is a vital component of climate that affects many ecosystems and human populations, so any possible changes in its position could have major implications for them. Liu *et al.* show that, for the past 280,000 years at least, the average position of the ITCZ in the western Pacific has been controlled by a combination of solar obliquity and precession. The dependence that they see on the thermal

state of the atmosphere may provide insights into possible effects on the ITCZ from anthropogenic global warming. — HJS

*Nat. Commun.* 10.1038/ncomms10018 (2015).

## NEUROSCIENCE

### Committing to memory

Neuronal networks in the brain can expand during memory formation, but where do the additional neurons come from? Hill *et al.* visually tracked this process in the marine mollusk *Tritonia diomedea*, as the animal became more sensitized to a stimulus that evokes its escape swim response. Inactive neurons appeared to be “pre-positioned” for rapid recruitment into an existing network as the animal displayed a learned response. As the memory faded, some new recruits remained committed to the network, while some original neurons departed. Continual change in the cellular constituents of a network may be a mechanism of memory formation. — LDC

*Curr. Biol.* **25**, 1 (2015).



Changes in the neuronal network may consolidate memory, as seen in the *Rosy Tritonia*

## MITOCHONDRIA

### Mitochondrial quality control

Mitochondria contain proteins encoded by the nucleus and by their own mitochondrial genome. Sometimes protein synthesis within the mitochondria goes wrong, which can damage both mitochondrial and cellular fitness. Richter *et al.* interfered with intramitochondrial protein synthesis by means of an antibiotic and found that misfolded proteins accumulated at the inner mitochondrial membrane. This compromised the mitochondrial membrane potential, kicking into gear a mechanism to put the brakes on mitochondrial protein synthesis. The reduction in mitochondrial protein synthesis protected the mitochondria from further damage. This quality-control mechanism would be expected to protect mitochondria in the event of short-term perturbations of mitochondrial translation. — SMH

*J. Cell Biol.* **211**, 373 (2015).

## CARBENE CHEMISTRY

### Crystal structure of a rhodium carbene

It often is challenging in chemistry to characterize highly reactive compounds. The trouble is that modifications that render them sufficiently stable to study detract from the very properties underlying the reactivity of interest. Werlé *et al.* now report success in the low-temperature preparation and isolation of crystals of a dirhodium carbene complex. They elucidated its structure by x-ray diffraction of the compound in the solid state, as well as by using several spectroscopic techniques in solution. Moreover, they confirmed that it indeed manifested the reactivity for which this class of compounds is prized: transfer of the divalent carbon to an olefin to form a cyclopropyl ring. They also observed facile transfer of the carbene from rhodium to gold. — JSY

*Angew. Chem. Int. Ed.* 10.1002/anie.201506902 (2015).

# Science

## A shifting wet girdle around the tropics

H. Jesse Smith

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