

hemi-methylated sites are rapidly methylated to maintain faithful methylation patterns. Xu and Corces mapped genome-wide strand-specific DNA methylation sites on nascent chromatin, confirming such maintenance in the vast majority of the DNA methylome (see the Perspective by Sharif and Koseki). However, they also identified a small fraction of sites that were stably hemi-methylated and showed their inheritance at CTCF (CCCTC-binding factor)/cohesin binding sites. These inherited hemi-methylation sites were required for CTCF and cohesin to establish proper chromatin interactions. —SYM

Science, this issue p. 1166;
see also p. 1102

MALARIA

Malaria relief, one amino acid at a time

Malaria infection during pregnancy can disrupt placental vasculature and cause complications. Nitric oxide plays a key role in placental vascular function, and its synthesis requires L-arginine. L-arginine and nitric oxide are both depleted during malaria-induced hemolysis, and many people in malaria-endemic areas lack sufficient L-arginine in their diets. McDonald *et al.* examined the effects of dietary L-arginine supplementation. In a cohort of pregnant women in Malawi, the blood of patients with malaria had less L-arginine, and



Malaria-infected pregnant women in Malawi lack L-arginine.

this was associated with worse pregnancy outcomes. Conversely, L-arginine supplementation in a mouse model of malaria in pregnancy improved fetal weight and viability. —YN

Sci. Transl. Med. **10**, eaan6007 (2018).

GEOCHEMISTRY

Encapsulating Earth's deep water filter

Small inclusions in diamonds brought up from the mantle provide valuable clues to the mineralogy and chemistry of parts of Earth that we cannot otherwise sample. Tschauer *et al.* found inclusions of the high-pressure form of water called ice-VII in diamonds sourced from between 410 and 660 km depth, the part of the mantle known as the transition zone. The transition zone is a region where the stable minerals have high water storage capacity. The inclusions suggest that local aqueous pockets form at the transition zone boundary owing to the release of chemically bound water as rock cycles in and out of this region. —BG

Science, this issue p. 1136

SOCIAL SCIENCE

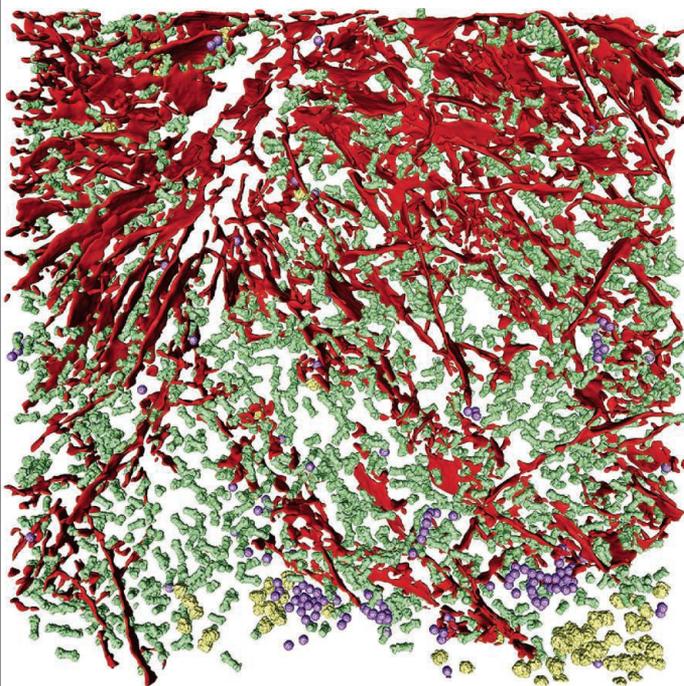
Lies spread faster than the truth

There is worldwide concern over false news and the possibility that it can influence political, economic, and social well-being. To understand how false news spreads, Vosoughi *et al.* used a data set of rumor cascades on Twitter from 2006 to 2017. About 126,000 rumors were spread by ~3 million people. False news reached more people than the truth; the top 1% of false news cascades diffused to between 1000 and 100,000 people, whereas the truth rarely diffused to more than 1000 people. Falsehood also diffused faster than the truth. The degree of novelty and the emotional reactions of recipients may be responsible for the differences observed. —BJ

Science, this issue p. 1146

IN OTHER JOURNALS

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



Poly-GA aggregate within a neuron

PROTEOSTASIS

Gumming up the works

Amyotrophic lateral sclerosis (ALS) is a neurodegenerative disorder that has been linked to toxic aggregates of poly-Gly-Ala (poly-GA) peptides generated by aberrant translation of an expanded nucleotide repeat sequence. Proteasomes are cytosolic molecular machines involved in the degradation of misfolded and aggregated proteins. Guo *et al.* used cryo-electron tomography to examine the molecular architecture of poly-GA aggregates in situ in intact neurons. The peptide aggregates formed twisted ribbons that clumped together and that were surrounded by proteasomes trapped in their normally transient substrate-processing conformation. The extent of proteasome accumulation was such that the ability of the remaining proteasomes within the neuron to perform their normal housekeeping functions was likely to be impaired, potentially explaining the neuronal pathologies observed in ALS. —SMH

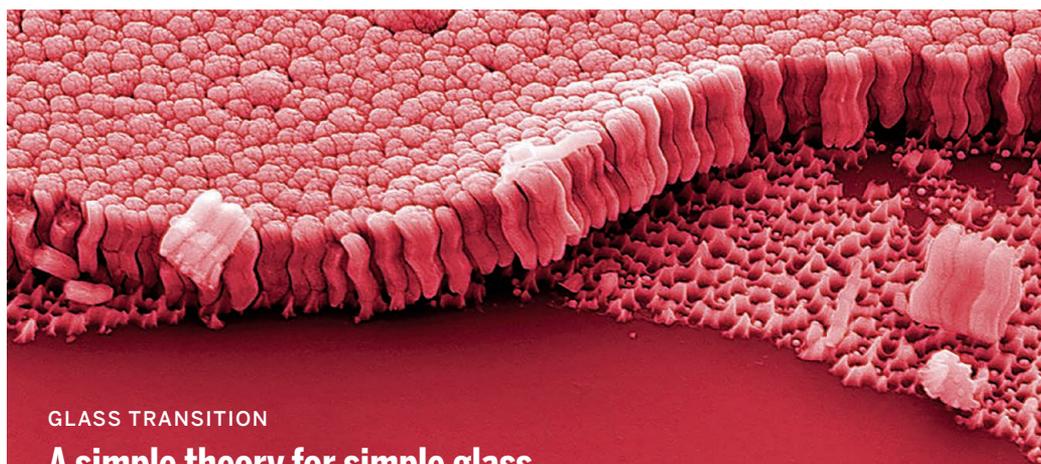
Cell **172**, 696 (2018).

NEUROSCIENCE

Speed representation in the brain

Speed- and direction-responsive neurons in the medial entorhinal cortex and the hippocampus form a major component of the mammalian space representation system.

There are long-range GABAergic projections between these two brain regions. Some of these inputs originate from parvalbumin-expressing inhibitory neurons. However, it has not been shown whether the parvalbumin cells projecting to the hippocampus are speed cells. Ye *et al.* used extracellular



GLASS TRANSITION

A simple theory for simple glass

Glasses have many important industrial applications, yet understanding the changes that occur over the wide range of time and length scales of the glass transition remains a challenge. Hansen *et al.* performed simultaneous neutron scattering and dielectric spectroscopy measurements that allowed dynamic observations to be made over an impressive 14 orders of magnitude. Unexpectedly, for van der Waals fluids, they found identical dynamics across this massive time scale at different state points in the phase diagram. This finding dramatically simplifies the theory that describes these fluids, which include technologically important materials such as metallic glasses. —BG

Nat. Commun. 10.1038/s41467-017-02324-3 (2018).

A microscopic image of glass made from a metallic alloy

recording, optogenetic tagging, and immunohistochemistry to investigate whether, and how, speed-responsive cells in the entorhinal cortex and hippocampus are functionally connected. The majority of medial entorhinal speed cells were fast-spiking, the hippocampus received direct input from such cells, and GABAergic long-range projections to the hippocampus originated almost exclusively from parvalbumin-positive neurons. This indicates that hippocampus-projecting speed cells are part of this subpopulation. —PRS

Proc. Natl. Acad. Sci. U.S.A. 10.1073/pnas.1720855115 (2018).

SIGNAL TRANSDUCTION

Protein kinase signaling without phosphorylation

Protein kinases usually propagate signals by phosphorylating substrate molecules. Goncharov *et al.* find a different mechanism for the protein kinase RIP2 (receptor interacting protein 2) in inflammatory signaling.

RIP2 acts in the innate immune system to signal the detection of bacterial infection. The authors found that inhibitors of RIP2's protein kinase activity prevented signaling not by reducing autophosphorylation (no other substrates for the kinase are known) but rather by inhibiting interaction of RIP2 with the ubiquitin ligase XIAP (x-linked inhibitor of apoptosis). Ubiquitination of RIP2 by XIAP was in turn required for proper signaling. This unusual mechanism, whereby dimerization of RIP2 appears to alter protein interactions rather than kinase activity to propagate a signal, could provide a therapeutic target for inflammatory diseases in which such signaling is inappropriately activated. —LBR

Mol. Cell 10.1016/j.molcel.2018.01.016 (2018).

BATTERIES

A solid electrolyte

In an electrochemical cell, the electrolyte has the role of separating and shuttling ions to

produce a current. A good electrolyte thus should have high ionic conductivity and good thermal and electrochemical stability, although many in use do not have all these attributes. For example, solid electrolytes can show greater stability, but they are often poorer conductors. Joos *et al.* consider a deep eutectic solvent, in which the combination of two compounds radically lowers the melting temperature, immobilized within a silica matrix to form a gel. This material was easily processed, had decent ionic conductivity and thermal stability up to 130°C, and was successfully cycled in a Li/LiFePO₄ cell. —MSL

Chem. Mater. 10.1021/acs.chemmater.7b03736 (2018).

EDUCATION

Scientific reasoning on paper

Helping students develop skills in both critical thinking and scientific reasoning is fundamental

to science education. However, the relationship between these two constructs remains largely unknown. Dowd *et al.* examined this issue by investigating how students' critical thinking skills related to scientific reasoning in the context of undergraduate thesis writing. The authors used the BioTAP rubric to assess scientific reasoning and the California Critical Thinking Skills Test to assess critical thinking. Results support the role of inference in scientific reasoning in writing, while also revealing other aspects of scientific reasoning (epistemological considerations and writing conventions) not related to critical thinking. In considering future implications for instruction, the authors suggest that further research into the impact of interventions focused on specific critical thinking skills (i.e., inference) for improved science reasoning in writing is needed. —MMc

CBE Life Sci. Educ. 10.1187/cbe.17-03-0052 (2018).

FRAMEWORK MORPHOLOGY

Mesocrystal morphogenesis

Control of the formation of mesoscale crystals of metal-organic framework (MOF) compounds can offer ways to control their reactivity and sorption properties and create more elaborate structures. Hwang *et al.* show that a copolymer with two hydrophilic blocks—polyethylene oxide and polymethylmethacrylate—modulates the crystal formation of a MOF in which zinc cations and bdc (benzene-1,4-dicarboxylic acid) linkers form two-dimensional sheets connected by a second ligand that act as pillars. The copolymer kinetically favors metastable hexagonal crystal polymorphs. After partial removal of the copolymer with methanol soaking, the crystals transform into more stable tetragonal crystals. —PDS

J. Am. Chem. Soc. 10.1021/jacs.7b12633 (2018).