

neocortex. They observed discrete high-frequency neocortical oscillations called ripples only in the association cortex. These cortical ripples shared many properties with hippocampal ripples. Hippocampal ripples were coupled with cortical ripples in the posterior parietal cortex, an association cortical area linked to navigational planning. This coupling was increased during sleep after the induction of long-term hippocampal-dependent spatial memory. —PRS

*Science*, this issue p. 369

## INFLUENZA

### An antibody to battle flu B

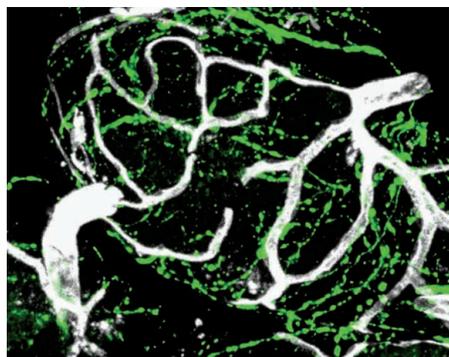
Although it circulates globally and is prevalent enough to warrant inclusion in the seasonal influenza vaccine, influenza B is not nearly as well studied as its cousin influenza A, and therapeutics are lacking. Shen *et al.* generated a potent antibody that inhibits diverse strains of influenza B virus. The antibody recognizes the receptor-binding site in hemagglutinin, a region critical to viral entry, and was shown to be effective therapeutically in mice and ferrets. This antibody could be widely deployed to treat or prevent influenza B infection around the world. —LP

*Sci. Transl. Med.* **9**, eaam5752 (2017).

## CANCER

### Tumor angiogenesis gets nervous

The microenvironment of solid tumors hosts many intercellular



Neurons (green) may promote increases in blood vessels (white) in prostate cancer.

conversations that can either enhance or inhibit tumor growth. Interestingly, the tumor cells need not be direct participants in these conversations. Zahalka *et al.* studied genetically manipulated mouse models and found that adrenergic signals from autonomic nerves in the prostate cancer microenvironment fueled tumor growth by altering the metabolism of blood vessel endothelial cells (see the Perspective by Hayakawa and Wang). These nerve-derived signals suppressed oxidative phosphorylation in the endothelial cells, activating an angiogenic switch that facilitated rapid tumor growth. This cross-talk between nerves and endothelial cells could potentially offer a target for cancer therapies. —PAK

*Science*, this issue p. 321;  
see also p. 305

## MARINE BIODIVERSITY

### Gradients in marine biodiversity

Marine animal biodiversity increases severalfold toward the tropics, but a general theory to explain this is lacking. Edgar *et al.* used extensive global surveys to address this question for fish and mobile invertebrates on rocky reefs over 100° of latitude. Regional diversity was highest near the equator, but local diversity reflected abundances that differed between fish, which peaked in the tropics, and invertebrates, which peaked at higher latitudes. These patterns correlated with temperature gradients for fish and nutrients for invertebrates.

Thus, fish appear to have limited the local abundance and diversity of invertebrates in the tropics. Regionally, however, diversity depended strongly on the area of suitable reef habitat, raising alarm about the loss of biodiversity as tropical reefs decline. —JJ

*Sci. Adv.* 10.1126/sciadv.1700419 (2017).

## IN OTHER JOURNALS

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



Children begin to understand the difference between institutional objects (such as money) and standard artifacts (such as hammers) at a young age.

## COGNITIVE SCIENCE

### A hammer is a hammer is a hammer

Hammers are designed to strike other objects, such as a nail or a rivet. A hammer's use is independent of cultural norms or social agreements, in contrast to money, whose value and function as a medium of exchange very much relies on a common understanding, which can change when the consensus changes. Noyes *et al.* show that young children begin to grasp the difference between what the authors refer to as institutional (socially dependent) objects and standard artifacts, such as hammers and chairs, between the ages of 4 and 9 years. —GJC

*Cognition* 10.1016/j.cognition.2017.09.008 (2017).

## EPILEPSY

### Small groups influence large networks

How small groups of neurons can interact with large networks in the brain is a crucial question in epilepsy research. Eissa *et al.* analyzed multielectrode array recordings from epileptic patients and found that during seizures, local action-potential activity organized into tiny wave fronts that correlated with network activity on scales that were orders of magnitude larger. These correlations did not exist between seizures or in neuronal activity outside the wave

front. Computational modeling revealed an antagonistic role for feedforward inhibition. At the local level, inhibition failed, which permitted the wave front to propagate. In contrast, at a much larger scale, feedforward inhibition created the conditions for the seizure to cease after the wave front had vanished. —PRS

*Proc. Natl. Acad. Sci. U.S.A.* 10.1073/pnas.1702490114 (2017).

## CELL BIOLOGY

### PolyQ caught in the act?

Huntington's disease is a neurodegenerative disorder caused by the expanded



Monterey Canyon, CA. Bedrock type and sediment flux are the most important factors explaining the location of submarine canyons.

## MARINE GEOLOGY

### Sorting out submarine canyons

**S**ubmarine canyons, often found directly off the coastline, are common but understudied features of Earth. Despite their prevalence, what determines their location and morphology remains a mystery. Smith *et al.* used a massive data set from the entire western coast of the United States to determine what variables best correlated with underwater canyon formation. They found that the distribution of rock type and sediment flux were the most important factors for explaining the location of submarine canyons. —BG

*Geophys. Res. Lett.* 10.1002/2017GL075139 (2017).

polyglutamine (polyQ) repeat of mutant huntingtin (mHtt). PolyQ expansions result in protein aggregation into large neuronal inclusion bodies (IBs). These IBs are often regarded as protective deposits of toxic soluble species. Bäuerlein *et al.* used cryo-electron tomography to analyze the structure of mHtt IBs in mammalian cells and neurons under close-to-native conditions and at molecular resolution. The mHtt IBs consisted of radially arranged fibrils that closely interacted with cellular endomembranes, particularly the endoplasmic reticulum (ER). The interaction appeared to alter ER function and membrane dynamics at the IB periphery. Thus,

rather than being inert deposits, mHtt IBs may mediate aspects of polyQ pathology. —SMH

*Cell* **171**, 179 (2017).

## NONLINEAR SYSTEMS

### Causal interactions in dynamical systems

Classically, causality requires that state A has independent information that influences state B. If this happens only in one direction, A is said to causally act on B. In nonlinear dynamical systems, however, interactions are mutual. Their parts cannot be separated in this simple way. A definition of causal efficacy that generalizes the classical

unidirectional (“acyclic”) notion of causality to the nonseparable bidirectional (“cyclic”) case is missing. Harnack *et al.* propose a mathematically transparent definition of effective causal influences in cyclic dynamical systems. This relies on reconstructions of the system’s overall state from measurements. Reconstructions are obtained in parallel from observations at different system components. Although generally the respective reconstructions are topologically equivalent, the mapping among the reconstructions exhibits distortions that reflect effective causal influences. —PRS

*Phys. Rev. Lett.* **119**, 098301 (2017).

## IMMUNOLOGY

### Notch signaling schools thymic DCs

Conventional and plasmacytoid dendritic cells in the thymus are important for the establishment of central tolerance. They induce autoreactive T cell death and generate regulatory T cells. Although these cells are believed to have an extrathymic origin, Martín-Gayo *et al.* uncovered evidence that human early thymic progenitors (ETPs) are another source. From postnatal thymocytes, ETPs differentiate into CD123<sup>+</sup> common dendritic cell progenitors that can reconstitute dendritic cells in immunodeficient murine thymi. JAG1-mediated Notch signaling in medullary niches is critical for this process. The idea is that thymic progenitors, which escape strong Notch signaling via ligands such as DLL1 and DLL4 and then encounter JAG1, become myeloid-primed by up-regulating GATA2 and turning off GATA3. —STS

*J. Exp. Med.* 10.1084/jem.20161564 (2017).

## POLITICAL SCIENCE

### The internet and political polarization

Many commentators have discussed the increase in political polarization in the United States and have blamed it on the internet and social media. Boxell *et al.* used data from the American National Election Studies and the Pew Research Center to look at demographic changes in polarization between 1996 and 2016. Unsurprisingly, younger people adopted the internet and social media much faster than the elderly. However, by several measures, those older than 65 increased more in polarization between 1996 and 2016 than those aged 18 to 39. Thus, for reasons still not fully understood, the people who tend to use internet and social media the least have undergone the highest increase in polarization. —BJ

*Proc. Natl. Acad. Sci. U.S.A.* 10.1073/pnas.1706588114 (2017).