

However, mechanisms are also needed to block expression of genes that specify other cell lineages. Kim *et al.* identified such a mechanism in the *Drosophila* male germ line. A multiple-zinc finger protein and a chromatin remodeler were found to act together to block transcription from cryptic promoters. These factors prevented aberrant gene expression and enabled proper differentiation in the adult sperm stem cell lineage. —BAP

Science, this issue p. 717

NITROGEN CYCLE

From air to shining sea

Nitrogen is an essential nutrient for phytoplankton growth. Nitrogen is primarily supplied to the surface ocean by mixing from below. However, as fertilizer use and combustion of fossil fuels rise, the atmosphere is expected to become an increasingly important source. Ren *et al.* measured nitrogen isotopes in organic matter from a South China Sea coral (see the Perspective by Boyle). Their findings suggest that atmospheric deposition of anthropogenic nitrogen began right at the end of the 20th century. This pathway now supplies nearly one quarter of the annual nitrogen input to the surface ocean in this region. —HJS

Science, this issue p. 749;
see also p. 700

NEUROSCIENCE

A brain region for social cognition

Monkeys recognize social interactions and their meanings quickly and effortlessly. Little is known about the neural circuitry that underlies this understanding. Sliwa and Freiwald scanned monkey brains as the monkeys watched static or moving stimuli. A subset of brain areas was exclusively active during monkey-monkey interactions, as opposed to physical interactions between two objects. This network shares some of its components with the monkey mirror neuron system mapped

previously by others and with a possible homolog of the human network involved in the theory of mind. —PRS

Science, this issue p. 745

REPRODUCTIVE BIOLOGY

Why antioxidants do not prevent preeclampsia

Preeclampsia impairs fetal growth and can damage maternal organs. Reactive oxygen species (ROS) have been proposed to increase the risk of preeclampsia by blocking blood vessel formation (angiogenesis) in the placenta. However, using a mouse model of preeclampsia, Nezu *et al.* found that decreasing ROS levels led to reduced placental angiogenesis, fetal growth, and maternal survival. In contrast, increased ROS levels resulted in greater placental angiogenesis and improved fetal and maternal outcomes. These results help to explain why antioxidants have been ineffective at preventing preeclampsia in clinical trials. —WW

Sci. Signal. **10**, eaam5711 (2017).

HIV

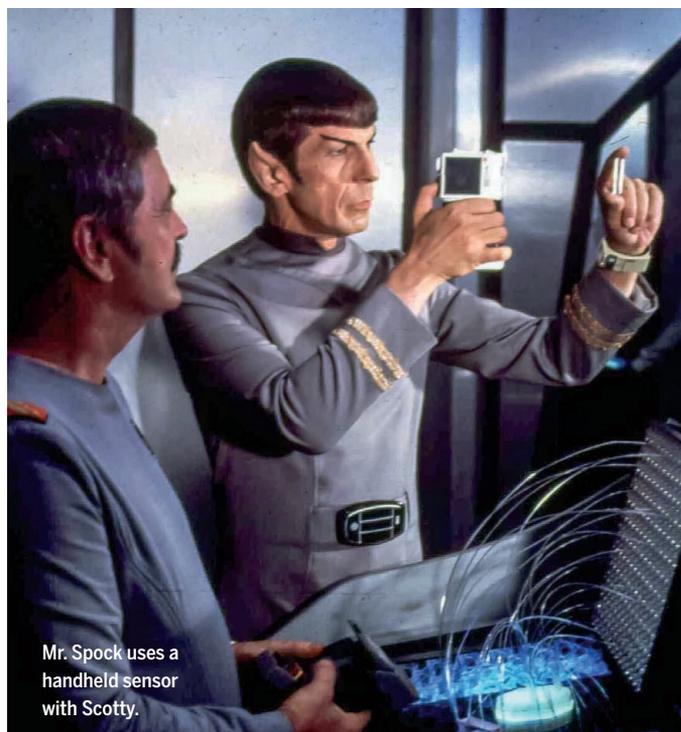
Taking HIV to the gut

Antiretroviral therapy (ART) effectively limits HIV replication. Nevertheless, HIV⁺ individuals need to be medicated for life because ART withdrawal results in rebound of persistent virus. One emerging approach to target HIV is an antibody against integrin $\alpha 4\beta 7$. Integrin $\alpha 4\beta 7$ is a receptor that facilitates homing of CD4⁺ T cells to the gut, a key site for HIV persistence. Guzzo *et al.* found that integrin $\alpha 4\beta 7$ is incorporated into the HIV envelope, suggesting that antibody treatment may directly interfere with the ability of HIV to home to intestinal tissues. Their results change our perception of the role of integrin $\alpha 4\beta 7$, a promising therapeutic target in HIV pathogenesis. —AB

Sci. Immunol. **2**, eaam7341 (2017).

IN OTHER JOURNALS

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



Mr. Spock uses a handheld sensor with Scotty.

NANOTECHNOLOGY

Just one drop will do it

Handheld sensors, often found in science fiction stories as a way of collecting a broad spectrum of data with a single device, are becoming real devices through the continuous miniaturization of technology. Engel *et al.* combine an electronic array of sensors with optical microspectroscopy and atomic force microscopy, based on two-dimensional materials, on a single platform. Liquids can be distinguished both electronically and optically, and dynamic surface wetting can also be monitored. At the limits of the device, the topography and optical spectra of isolated oil emulsion droplets with volumes less than 10 attoliters could be determined. —MSL

Nano Lett. **10**, 1021/acs.nanolett.6b03561 (2017).

DEVELOPMENT

Mom tells virus what to do

Mother's directions must be followed, even in the earliest stage of embryo development. The maternal genome is read up until a phase called the maternal-to-zygotic transition. At this point, which corresponds to the two-cell stage in mice, the embryonic genome takes over. Using

single-cell analyses, Huang *et al.* examined the function of the maternal factor Stella. Widespread transcription changes result when Stella is eliminated. In particular, endogenous retroviruses such as MuERV-L that are normally active in the early embryo display impaired expression when Stella is knocked down in vivo. Hence, the normal activity of ancient viruses must be properly turned on for transitioning



Higher sea surface temperatures are increasing algal blooms in northern oceans.

OCEAN ECOLOGY

Expanding toxic algal blooms

Ocean temperatures in the North Atlantic and North Pacific oceans have increased in recent decades, particularly in coastal areas. This has been associated with increased algal blooms and, where these blooms include algal species that produce biotoxins, the potential for increases in cases of paralytic and diarrhetic shellfish poisoning. Gobler *et al.* used high-resolution records of sea surface temperature from 1982 to 2016 and temperature-dependent growth rates of two toxic algal species to create models of harmful algal blooms. These models were validated in areas of the North Atlantic by observations in other studies of increased bloom frequency and range that matched predicted locations. This information could potentially be used to predict the future spread of harmful algal blooms and the consequent impact on human health. —CHG

Proc. Natl. Acad. Sci. U.S.A. **114**, 4975 (2017).

from maternal to zygotic control in development. —BAP
eLife 10.7554/eLife.22345 (2017).

METABOLIC DISEASE

Genes and BMI conspire to make fatty liver

Nonalcoholic fatty liver disease (NAFLD) is estimated to affect 20% of the world's population. NAFLD begins with an abnormal buildup of fat in the liver that is "clinically silent." In a subset of individuals, NAFLD progresses to liver inflammation, cirrhosis, and cancer. Identifying which individuals will progress is a major goal of current research. Stender *et al.* take a step toward this goal by studying gene-environment interactions. They find that high BMI (body mass index), a well-known risk factor for NAFLD, amplifies the effects of certain genetic risk factors. Obese individuals carrying a specific allele of the *PNPLA3* gene, for example, have nearly a sixfold greater risk of developing cirrhosis than obese individuals carrying a different allele. —PAK
Nat. Genet. 10.1038/ng.3855 (2017).

MICROBIOTA

Mutualists endow certain appetites

Life span and reproductive success can depend on controlling dietary protein intake. Yet the importance of gut microbial symbionts in appetite control is not understood. Leitão-Gonçalves *et al.* used the fruitfly, *Drosophila*, to test what influence their microbiota might have on food choice. Fruitflies like sugar, but after they have mated, they prefer to eat yeast to gain essential amino acids for egg-making. By knocking out the phenylalanine hydroxylase gene, flies can be duped into sensing that tyrosine is an essential amino acid. If tyrosine is missing from a chemically defined diet, the engineered flies' fecundity falls and, if given the choice, they will voraciously eat yeast to compensate for the missing nutrient. If particular live microbiota species (*Acetobacter pomorum* and *Lactobacilli*) are introduced into the food of the engineered flies, they lose their taste for yeast and resume egg-laying. Unexpectedly, the microbiota do not seem to directly provide

a compensatory source of the missing amino acid. The precise mechanism for the protective effect of the microbiota remains elusive. —CA

PLoS Biol. 10.1371/journal.pbio.2000862 (2017).

EDUCATION

Research experience is not just for students

The benefits of authentic research experiences for undergraduate students are well documented, but how do research advisors benefit from having undergraduate students in their lab? Hayward *et al.* interviewed 30 research advisors at various career stages about their motivation for supporting undergraduate research. Responses indicated that a blend of instrumental and intrinsic motivation influenced most advisors, whereas a small group of advisors, all in the early stages of their careers, reported only instrumental motivation. These differences in motivations likely affect the way that advisors work with students and may serve as the starting point for designing

new methods for training, and retaining, high-quality research advisors. —MM

CBE Life Sci. Educ. 10.1187/cbe.16-07-0229 (2017).

QUANTUM OPTICS

A game of quantum catch

Realization of a quantum communication network or quantum internet will depend on the ability to successfully transfer quantum states between nodes of the network. Photons are expected to be the carriers of that information, but scattering losses and a mismatch between sender and receiver nodes can limit their utility. By tuning the energy levels of a receiver dot and introducing filters that suppress noise, Delteil *et al.* demonstrate the transfer of single photons from one quantum dot to another 5 m away. Their method allows the receiver dot to signal absorption of a single photon without compromising the actual quantum state, thereby presenting a possible route for developing a larger quantum network. —ISO

Phys. Rev. Lett. **118**, 177401 (2017).