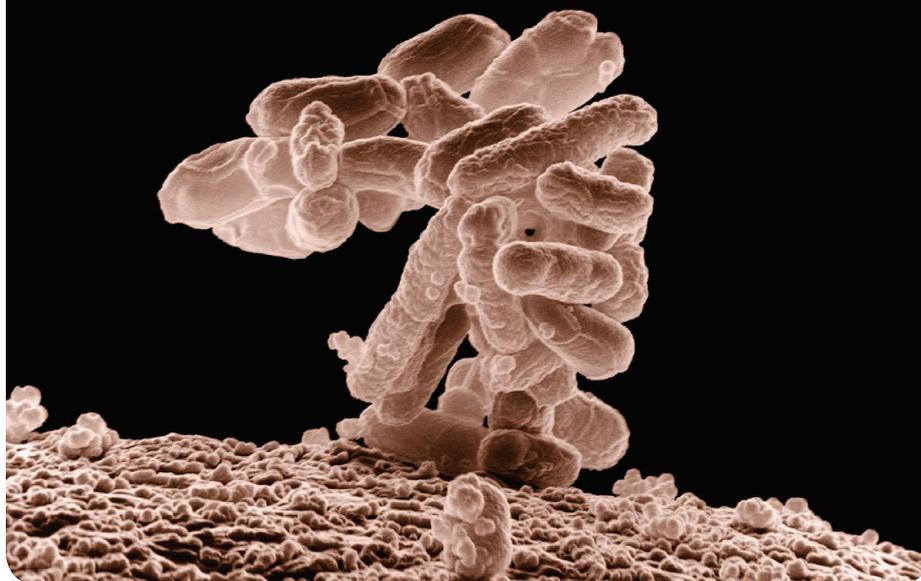


ENVIRONMENTAL SCIENCE

Recalcitrant Resistance

The increased use of antibiotics is resulting in a rise of antibiotic-resistant bacteria, and wastewater treatment plants (WWTPs) that employ biological remediation processes may provide a breeding ground for them as trace amounts of antibiotics arrive in the waste stream. Su *et al.* examined over 1000 *Escherichia coli* isolates collected from various treatment steps at two WWTPs in Guangdong Province, South China. At least 98% of the isolates were resistant to 1 of 12 screened antibiotics in either plant, and over 90% were resistant to at least three antibiotics. Plasmid-mediated quinolone resistance genes and an ampicillin resistance gene (*ampC*)—both common in clinical isolates—were found in ~43% of the isolates. Disinfection steps in the plants, including UV treatment and chlorination, reduced overall bacterial abundance; however, the percentage of antibiotic-resistant bacteria (and presence of plasmid-mediated resistance genes) was higher in effluent after various biological treatment steps. WWTPs can therefore serve as a reservoir and distribution center of antibiotic-resistant genes and bacteria. —NW

Environ. Sci. Processes Impacts 10.1039/c3em00555k (2014).



NEUROSCIENCE

Bring Up the Bodies

The physiology of face-selective cells in specialized cortical areas has been studied in great detail. We know much less about neurons in brain regions specializing in the visual representation of bodies. Functional MRI studies have identified areas that are activated by body images. Popivanov *et al.* recorded local field potentials and individual neuronal spikes from such brain scan-defined body-selective patches in the monkey superior temporal sulcus. Local field potential gamma power and neuronal population spikes were enhanced for body, compared to nonbody, images. Averaging responses from a group of individual cells caused category

selectivity in the neuronal population. Individual cells exhibited strong within-category selectivity and reacted to only a subset of bodies. A linear support vector machine classifier, trained using the spiking responses to a sample of the images, accurately classified untrained body images. Interestingly, the heterogeneous response properties of the neurons in the body patch allowed accurate classifications of all other classes,



even faces or artificial objects. The single units responded selectively to specific body parts even at different orientations. Neurons in this particular body patch thus show selectivity for both body and nonbody images, but with a stronger response to bodies. — PRS

J. Neurosci. 34, 95 (2014).

MOLECULAR BIOLOGY

Polycomb Recruitment via lncRNA

There are many protein complexes that modulate gene expression during differentiation and development. Each must be targeted to the correct regulatory sequences in the genome, to orchestrate the appropriate cell- or tissue-specific gene expression programs. Some complexes target DNA by direct binding to a specific DNA sequence. Others must be recruited by auxiliary factors to their place of action. None of the core components of the polycomb repressive complex-2 (PRC2) are able to bind DNA, yet PRC2 is targeted to, and critical for, repressing cell type-specific genes throughout development. The Jumonji family, ARID domain-containing protein JARID2, an accessory subunit of PRC2, is somehow involved in that recruitment process. Kaneko *et al.* show that JARID2 can bind to long noncoding RNAs (lncRNAs), among them Meg3, and this interaction recruits PRC2 to a subset of its target genes. Meg3 binding to JARID2 also stimulates the interaction of JARID2 with one of the core subunits of PRC2, EZH2, with which Meg3 can also interact. Binding of JARID2 to the Meg3 lncRNA thus serves both to recruit and assemble PRC2 on chromatin. — GR

Mol. Cell 53,10.1016/j.molcel.2013.11.012 (2014).

BIOMEDICINE

Interferon Boosts Efficacy

Therapeutic monoclonal antibodies, several of which have shown impressive outcomes in clinical trials, are an exciting avenue for treating cancer. Resistance to antibody treatment remains a major challenge, however, and so strategies to overcome such resistance are needed. Yang *et al.* report on one such strategy: Taking the knowledge that an increase in type I interferons (IFNs) correlates positively with clinical outcome in several cancers and that type I IFNs can enhance antitumor immunity in some models, the authors tethered IFN- β to a monoclonal antibody targeting the epithelial growth factor receptor (EGFR), which is approved for use in treating metastatic colorectal cancer and head and neck cancer. In a variety of tumor mouse models, including antibody-resistant tumor models, the antibody-

IFN therapy was more effective than antibody therapy alone. Mechanistic studies showed that IFN increases antitumor immune responses by enhancing antigen presentation to T cells by dendritic cells present in the tumor microenvironment. Delivery of the antibody-IFN therapy with an additional therapeutic monoclonal antibody enhanced the durability of the treatment, further supporting the idea that effective cancer immunotherapy will require hitting multiple targets. — KLM

Cancer Cell **25**, 37 (2014).

SOCIAL NETWORKS

Information and Freedom

There are many anecdotes linking digital media access to democracy, including the use of social media to organize and communicate information about protests. Rhue and Sundararajan col-



lected needed empirical data on 189 countries for the period 2000–2010. Democracy was measured as scores from the independent watchdog organization Freedom House on civil liberties, media freedom, and political rights. Digital access (mobile phone and Internet) was obtained from the International Telecommunication Union, an agency of the United Nations. Digital access was positively associated with civil liberties and media freedom. Mobile penetration had a greater impact on civil liberties than Internet access. Dynamic analyses revealed that greater access to mobile technology had an increased effect on civil liberties when a neighboring country (or a trade partner) scored high in civil liberties, suggesting that the diffusion of civil liberties is enhanced by digital access. — BJ

Soc. Networks **36**, 40 (2014).

APPLIED PHYSICS

Putting a Twist on Multiplexing

Light is a versatile medium for communication, with the optic fibers that span the globe forming the backbone of our Internet and communi-

cations industry. The insatiable hunger for even higher data rates and a faster Internet requires more light to be pumped along the fiber network. There is, however, a limit to how much light you can put into a fiber before optical nonlinearities are induced and the communications channel is corrupted. The traditional solution is to multiplex the various modes of light (wavelength and polarization, for instance) so the information is encoded in a number of channels (split between multiple wavelengths and polarization states) sent down the fiber in parallel, and then de-multiplexed at the other end: The aggregated data rate is boosted by the number of channels used. Recent work has explored the optical angular momentum of light, wherein the light is structured or twisted like a spiral and carries quantized units of angular momentum as it propagates. In a free-space demonstration, Huang *et al.* show that multiplexing wavelength, polarization, and optical angular momentum enables data transmission rates in excess of 100 Tbit/s. Transferring such a route of multiple multiplexing to optic fibers should stave off our hunger for faster data rates for a little while yet. — ISO

Opt. Lett. **39**, 197 (2014).

CHEMISTRY

Assembling Coated Nanocubes

For many applications of nanoparticles, it is desirable that they assemble into periodic structures or even crystallize. Knorowski and Travasset used a theoretical model to explore the effect of DNA coatings on phase diagrams for nanocube assembly. Previous studies have focused mainly on the assembly of hard cubes. The authors explored this case, as well as hard cubes (about 12 or 18 nm across) coated with single-stranded DNA strands lacking complementary ends (an f-star polymer) and pairs of nanocubes with complementary ends. The hard nanocube system evolved from a simple cubic (sc) packing to a triclinic phase for the f-star coating at isotropic pressure. For anisotropic osmotic pressures, body-centered cubic (bcc) ordering occurred, but the cubes developed a complex orientational ordering. For complementary DNA coatings, the results depended on strand length, with short strands creating face-to-face hybridization and sc lattices and longer strands creating a bcc packing. More complex ordering than the f-star system developed at high osmotic pressure. Because polymer coatings could be polymerized, it may be possible to use such phase behavior to direct nanocube assembly. — PDS

J. Am. Chem. Soc. **136**, 10.1021/ja406241n (2014).

Science

Information and Freedom

Barbara R. Jasny

Science **343** (6170), 463.

DOI: 10.1126/science.343.6170.463-a

ARTICLE TOOLS

<http://science.sciencemag.org/content/343/6170/463.1>

RELATED CONTENT

<file:/content/sci/343/6170/twil.full>

PERMISSIONS

<http://www.sciencemag.org/help/reprints-and-permissions>

Use of this article is subject to the [Terms of Service](#)

Science (print ISSN 0036-8075; online ISSN 1095-9203) is published by the American Association for the Advancement of Science, 1200 New York Avenue NW, Washington, DC 20005. 2017 © The Authors, some rights reserved; exclusive licensee American Association for the Advancement of Science. No claim to original U.S. Government Works. The title *Science* is a registered trademark of AAAS.