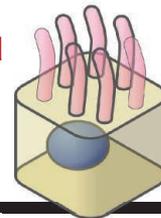


RESEARCH

The mitotic oscillator is co-opted during cilia multiplication

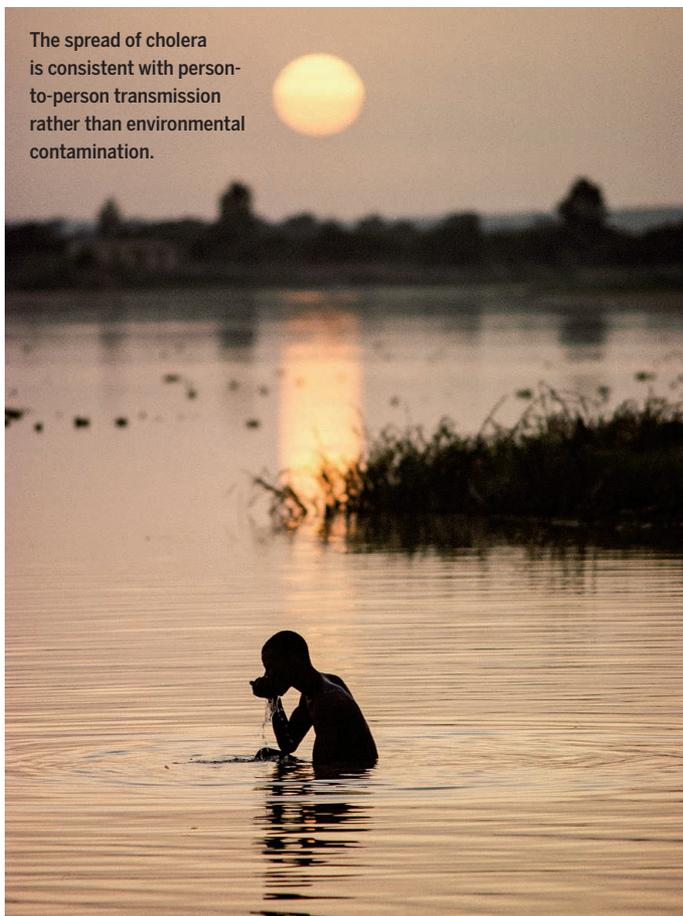
Al Jord et al., p. 803



IN SCIENCE JOURNALS

Edited by Stella Hurtley

The spread of cholera is consistent with person-to-person transmission rather than environmental contamination.



CHOLERA

Wave upon wave of disease

The cholera pathogen, *Vibrio cholerae*, is considered to be ubiquitous in water systems, making the design of eradication measures apparently fruitless. Nevertheless, local and global *Vibrio* populations remain distinct. Now, Weill *et al.* and Domman *et al.* show that a surprising diversity between continents has been established. Latin America and Africa bear different variants of cholera toxin with different transmission dynamics and ecological niches. The data are not consistent with the establishment of long-term reservoirs of pandemic cholera or with a relationship to climate events. —CA

Science, this issue p. 785, p. 789

ICE SHEETS

Disappearance of an ice sheet

The Cordilleran Ice Sheet is thought to have covered westernmost Canada until about 13,000 years ago, even though the warming and sea level rise of the last deglaciation had begun more than a thousand years earlier. This out-of-phase behavior has puzzled glaciologists because it is not clear what mechanisms could account for it. Menounos *et al.* report measurements of the ages of cirque and valley glaciers that show that much of western Canada was ice-free as early as 14,000 years ago—a finding that better agrees with the record of global ice volume (see the Perspective by Marcott and Shakun). Previous reconstructions seem not to have adequately reflected the complexity of ice sheet decay. —HJS

Science, this issue p. 781;
see also p. 721

DNA REPLICATION

Metabolic regulation of genome stability

Cells respond to metabolic fluctuations by adjusting the speed of DNA replication as a safeguard for genome stability. Somyajit *et al.* elucidate the cellular mechanisms that align replication fork dynamics with metabolic pathways (see the Perspective by Gómez-González and Aguilera). The elevation of reactive oxygen species (ROS) levels under metabolic stress dissociates a replication accelerator from the replisome and leads to replication slowdown,

thus preventing replication stress. Studying this genome surveillance mechanism in cancer cells with elevated ROS levels and increased replication adaptability may provide opportunities to specifically target tumors. —SYM

Science, this issue p. 797;
see also p. 722

POLITICAL SCIENCE

Measuring the impact of the media

The active participation of the people is one of the central components of a functioning democracy. King *et al.* performed a real-world randomized experiment in the United States to understand the causal effect of news stories on increasing public discussion of a specific topic (see the Policy Forum by Gentzkow). Social media posts increased by almost 20% the first day after the publication of news stories on a wide range of topics. Furthermore, the posts were relatively evenly distributed across political affiliation, gender, and region of the United States. —GJC

Science, this issue p. 776;
see also p. 726

SCIENTIFIC COMMUNITY

Evaluating author contribution statements

Many journals require an author contribution statement that identifies who did what in the project. However, journals have different policies and practices, so it is unclear whether these statements add

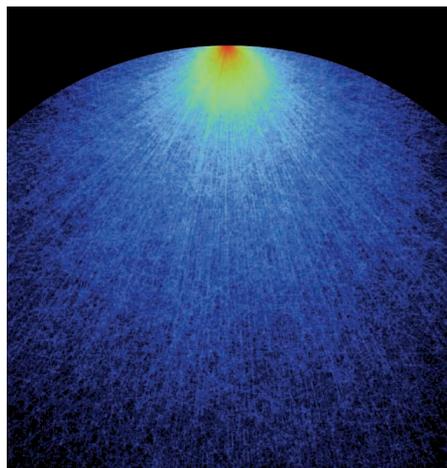
consistent value beyond the order of the authors. To quantify their utility and perceived value, Sauermann and Haeussler used data from more than 12,000 author contribution statements and surveyed 6000 corresponding authors. Author order correlated strongly with the breadth and type of author contribution, and most researchers, especially those at junior levels, saw value in the statements. However, author order was still perceived as a better indicator of contribution importance and was still favored when evaluating others. —AC

Sci. Adv. 10.1126/sciadv.1700404 (2017).

OPTICS

Scattered light, it is all the same

Materials can vary from transparent to opaque depending on the density of scatterers within the medium. As light propagates through a material, intuition might suggest that the more scatterers there are, the shorter the path along which the light can propagate. Savo *et al.* confirm a recent theoretical proposal that predicts that this is not the case. They shone light through a series of samples of varying scatterer density and found that the average path length that the light traveled was independent of the sample microstructure. This finding



The distance that light waves travel is independent of scatterer density.

should also be applicable to acoustics and matter waves. —ISO

Science, this issue p. 765

CANCER

De-stressing cancer with β -blockers

Common wisdom holds that stress is not good for cancer patients. However, stress can be difficult to avoid, considering that both the diagnosis of cancer and the associated treatments are quite challenging for the mind and body. Nilsson *et al.* investigated the potential effects of stress hormones during treatment of non-small cell lung cancer. Stress hormones activate β 2-adrenergic receptors on cancer cells, triggering a signaling cascade that promotes tumor resistance to EGFR (epidermal growth factor receptor) inhibitors, a key therapy for this disease. Conversely, β -blockers, a common class of drugs used in humans, blocked this mechanism of resistance and may become a useful adjunct to lung cancer therapy regimens. —YN

Sci. Transl. Med. 9, eaao4307 (2017).

COMPUTER SCIENCE

Fly brain inspires computing algorithm

Flies use an algorithmic neuronal strategy to sense and categorize odors. Dasgupta *et al.* applied insights from the fly system to come up with a solution to a computer science problem. On the basis of the algorithm that flies use to tag an odor and categorize similar ones, the authors generated a new solution to the nearest-neighbor search problem that underlies tasks such as searching for similar images on the web. —LBR

Science, this issue p. 793

IN OTHER JOURNALS

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

NEUROSCIENCE

Controlling cellular calcium concentration

Calcium-based signaling is used in many cellular and neuronal processes to initiate rapid responses to extracellular signals. Cells therefore maintain tight control over intracellular Ca^{2+} levels, using a variety of channels and pumps. Plasma membrane Ca^{2+} -ATPases (PMCA) are present in virtually all types of cells and transport Ca^{2+} to the extracellular space. Schmidt *et al.* used high-resolution proteomics, electrophysiology, biochemistry, and immunocytochemistry on wild-type and knockout cells and animals to study PMCA-interacting proteins. They identified two proteins, neuroplastin and basigin, as previously unrecognized auxiliary subunits of PMCA. Both neuroplastin and basigin are essential for the stability of the heterotetrameric PMCA complexes and for efficient control of PMCA-mediated Ca^{2+} removal under resting conditions and after activity-initiated Ca^{2+} influx. —PRS

Neuron 10.1016/j.neuron.2017.09.038 (2017).

Immunostaining of basigin (red), a key regulator of Ca^{2+} transport, in the cerebellum

CLINICAL TRIALS

A drug that fights both heart attack and cancer

Most drugs for heart disease work by lowering cholesterol. Yet even people with normal cholesterol levels can have heart attacks, suggesting that cholesterol is only one contributing factor. A new study reveals a key role for the pro-inflammatory molecule interleukin- 1β (IL- 1β) in cardiovascular disease. Ridker *et al.* report a clinical trial of

more than 10,000 people who had previously suffered a heart attack. They find that the drug canakinumab lowered the incidence of stroke, recurrent heart attack, or cardiovascular death by around 15%. Canakinumab works by specifically targeting IL- 1β -driven inflammation without affecting cholesterol. In the same trial, the drug was also associated with improved survival of patients with lung cancer. However, the trial was not without a downside, and

ALSO IN SCIENCE JOURNALS

Edited by Stella Hurtley

TOPOLOGICAL MATTER

Topological or trivial?

Evidence for Majorana bound states (MBS), which are expected to provide a platform for topological quantum computing, has been found in several material systems. Typically, the experimental signature is a peak in the spectrum at zero energy, but mechanisms other than MBS need to be carefully ruled out. Using spin-polarized scanning tunneling spectroscopy, Jeon *et al.* studied chains of iron atoms deposited on superconducting lead and found a more distinctive signature of the topological states. Unlike trivial zero-energy states, MBS exhibited a characteristic spin-polarization signal. —JS

Science, this issue p. 772

SOLAR CELLS

Transporter layers improve stability

Although perovskite solar cells can have power conversion efficiencies exceeding 20%, they can have limited thermal and ultraviolet irradiation stability. This is in part because of the materials used to extract the charge carriers (electrons and holes) from the active layer. Arora *et al.* replaced organic hole transporter layers with CuSCN to improve thermal stability. Device lifetime was enhanced when a conducting reduced graphene oxide spacer was added between the CuSCN layer and the gold electrode. —PDS

Science, this issue p. 768

ORGANIC CHEMISTRY

Lewis acid catalysis tackled by tag team

Molecular catalysts with two closely spaced nitrogen-hydrogen groups can act like a tweezer, activating a carbon center by latching onto a leaving group through double hydrogen bonding and then pulling it away.

In the resultant ion pair, the shape of the catalyst can bias an ensuing reaction to favor just one of two possible mirror-image products. Banik *et al.* used this motif to activate a Lewis acid cocatalyst, pulling a leaving group off silicon instead of carbon (see the Perspective by Mattson). The combined pair of catalysts is more effective for reactions such as asymmetric cycloadditions that involve weaker leaving groups on carbon. —JSY

Science, this issue p. 761;

see also p. 720

METABOLISM

Regulated lysosomal efflux of amino acids

A new technique allows rapid purification of lysosomes and metabolic profiling by liquid chromatography and mass spectrometry. Abu-Remaileh *et al.* engineered cultured human cells to produce a protein tag on lysosomal membranes that could be used to rapidly precipitate purified lysosomes on magnetic beads. Analysis of their contents under various conditions showed that efflux from the lysosome of most essential amino acids (but not that of most other amino acids) is a regulated process. Amino acid transport was inhibited under conditions of nutrient depletion as a result of inhibition of the mTOR (mechanistic target of rapamycin) protein kinase complex. —LBR

Science, this issue p. 807

NUTRIENT SENSING

SAMTOR joins the family

The amino acid methionine is widely appreciated to have interesting effects on animal physiology. Diets low in methionine increase longevity and overall health, particularly glucose homeostasis. Gu *et al.* describe a potential molecular link between the effects of methionine restriction and the growth controller mTOR complex 1 (mTORC1), a

well-validated regulator of life span and health span in many organisms. They identify a protein that they named SAMTOR as a component of the nutrient-sensing pathway upstream of mTORC1. SAMTOR directly binds S-adenosylmethionine (SAM), a metabolite made from methionine, and is necessary for regulating mTORC1 in response to methionine. —SMH

Science, this issue p. 813

CELL BIOLOGY

Taming mitosis for differentiation

The mitotic oscillator consists of molecular switches known to drive cell division forward. This conserved clocklike regulatory circuit has not previously been implicated in cellular processes other than division. Multiciliated cells generate motile cilia-powered flows that are essential for brain, respiratory, and reproductive functions. Al Jord *et al.* found that the mitotic oscillator was activated in a calibrated fashion in terminally differentiating progenitors of multiciliated cells (see the Perspective by Levine and Holland). The oscillator function was used to drive massive production of cilia-nucleating centrioles while avoiding mitotic commitment. Thus, mammalian postmitotic progenitors can recruit and calibrate the mitotic oscillator to impose timing and directionality of cellular differentiation instead of proliferation. —SMH

Science, this issue p. 803;

see also p. 716

INVASIVE SPECIES

Humans shape how plants invade

Human activities are introducing alien species to ecosystems around the world at an increasing rate. Some of these species become invasive and cause economic or environmental

harm. In a Perspective, Kueffer explains that human influence extends beyond the introduction of alien species to affect how such species spread across landscapes and which become invasive. Reframing invasion theories to take full account of these influences will help to explain and predict which species are likely to become invasive and where. —JFU

Science, this issue p. 724

NEUROENDOCRINOLOGY

Connecting smell to metabolism

There is accumulating evidence, particularly in rodents, that odor perception and olfactory neurons can regulate metabolism. For instance, ablating the sense of smell can lead to resistance to obesity induced by a high-fat diet. In a Perspective, Garrison and Knight discuss the potential mechanisms and implications of these findings with regard to the regulation of metabolism and how this may also affect longevity in mammals. —GKA

Science, this issue p. 718

FRAGILE X SYNDROME

Balancing translation and Rac1 signaling

The neurological dysfunction and intellectual disability of fragile X syndrome (FXS) is caused by loss of the mRNA translation repressor FMRP. Santini *et al.* found that loss of FMRP enhanced protein synthesis mediated by the translation-initiating factor eIF4E. As a result, the actin polymerization dynamics necessary for synaptic plasticity and learning were impaired. The peptide 4EGI-1, which inhibits the formation of eIF4E-mediated translational machinery, improved hippocampal synaptic function, dendritic morphology, and learning behaviors in FXS model mice. —LKF

Sci. Signal. **10**, eaan0665 (2017).

FUNGAL INFECTION

Calibrating antifungal responses

Immune responses to fungal infections are complicated by the fact that fungi can exist in multiple forms depending on environmental cues. Verma *et al.* evaluated innate immune responses to *Candida albicans*, a fungus that transitions from a single-celled yeast form to filamentous hyphae as infection progresses. Candidalysin, a hyphae-associated protein and virulence factor, served as a danger signal that potentiated the immune response to *C. albicans*. Candidalysin-deficient strains caused minimal epithelial damage and elicited a strongly blunted type-17 immune response. Thus, the innate anti-fungal responses to *C. albicans* are driven by a synergy between cellular damage triggered by candidalysin that is further amplified by interleukin-17-driven inflammation. —AB

Sci. Immunol. **2**, eaam8834 (2017).