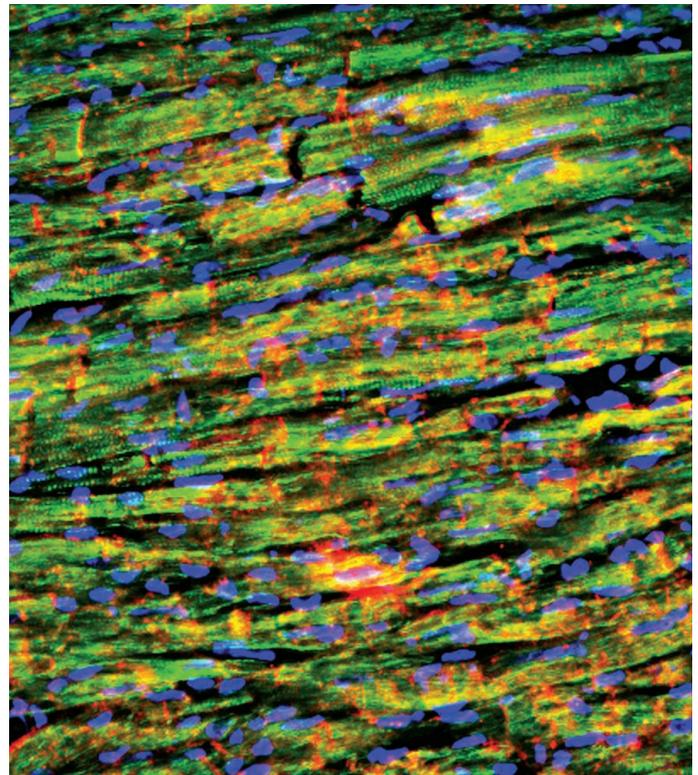


IN OTHER JOURNALS

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



New evidence sheds light on regeneration in human heart tissue.

DEVELOPMENT

Heal our breaking hearts

Myocardial infarction (heart attack) causes irreversible damage to the heart, leaving the survivor with reduced cardiac output and lowering their quality of life. Some animals, such as the zebrafish and the neonatal mouse, have a regenerative capacity, but until now, we have not been able to elucidate any regenerative capability in the adult human heart. Voges *et al.* have grown immature human cardiac organoids that display an innate ability to regenerate after injury. Unlike in adult tissue, these organoids do not form fibrotic scars and can recover functionally. The organoids provide the first insight into human cardiac regeneration and are a step toward finding a source for cellular therapy after cardiac damage. —MKE

Development 10.1242/dev.143966 (2017).

CANCER

The search for cancer cell vulnerabilities

Efficient screening of gene essentiality in mammalian cells, enabled by CRISPR-mediated gene editing, offers the opportunity to search for genes that are particularly required for

proliferation and survival of tumor cells. Wang *et al.* used such screens to search for genes that are essential for growth in cancer cells driven by RAS mutations commonly found in human cancers. Such screens can help reveal functionally important interactions. The authors identified PREX1 as a key activator

Fountain, which approaches the theoretical maximum for information stored per nucleotide. They demonstrated efficient encoding of information—including a full computer operating system—into DNA that could be retrieved at scale after multiple rounds of polymerase chain reaction. —LMZ

Science, this issue p. 950

with contemporaneous or later humans elsewhere, and some are closer to those of Neandertals. The analysis illuminates shared long-term trends in human adaptive biology and suggests the existence of interconnections between populations across Eurasia during the later Pleistocene. —AMS

Science, this issue p. 969

PLANT SCIENCE

Widespread resistance, localized relief

Rice blast fungus can devastate a rice harvest. Genes that provide resistance to the fungus usually depress rice yield. Deng *et al.* analyzed the molecular underpinnings of a rice variant that is resistant to rice blast but still high-yielding (see the Perspective by Wang and Valent). The key locus encodes several R (resistance) genes. One gene confers resistance and is expressed throughout the plant. Another gene fails to confer resistance and is expressed only in pollen and panicles (the rice-producing flower clusters). Because the R proteins function as dimers, heterodimerization in pollen and panicles disables resistance. The plants thus produce smaller but more numerous rice grains, which sustains yield, while the body of the plant resists fungal infection. —PJH

Science, this issue p. 962;
see also p. 906

PALEOANTHROPOLOGY

Morphological mosaics in early Asian humans

Excavations in eastern Asia are yielding information on human evolution and migration. Li *et al.* analyzed two fossil human skulls from central China, dated to 100,000 to 130,000 years ago. The crania elucidate the pattern of human morphological evolution in eastern Eurasia. Some features are ancestral and similar to those of earlier eastern Eurasian humans, some are derived and shared

PAIN RESEARCH

A pain killer without side effects

Opioids are very strong and effective pain killers. However, they also have a range of well-known side effects and can cause addiction. Painful conditions such as inflammation or trauma are often associated with localized tissue acidification. Spahn *et al.* designed a novel opioid receptor agonist that, unlike clinically used opioids, best activates the receptors in such acidified tissues. In rat models of inflammatory pain, the new drug exerted strong pain relief essentially without the side effects of standard opioids. —PRS

Science, this issue p. 966

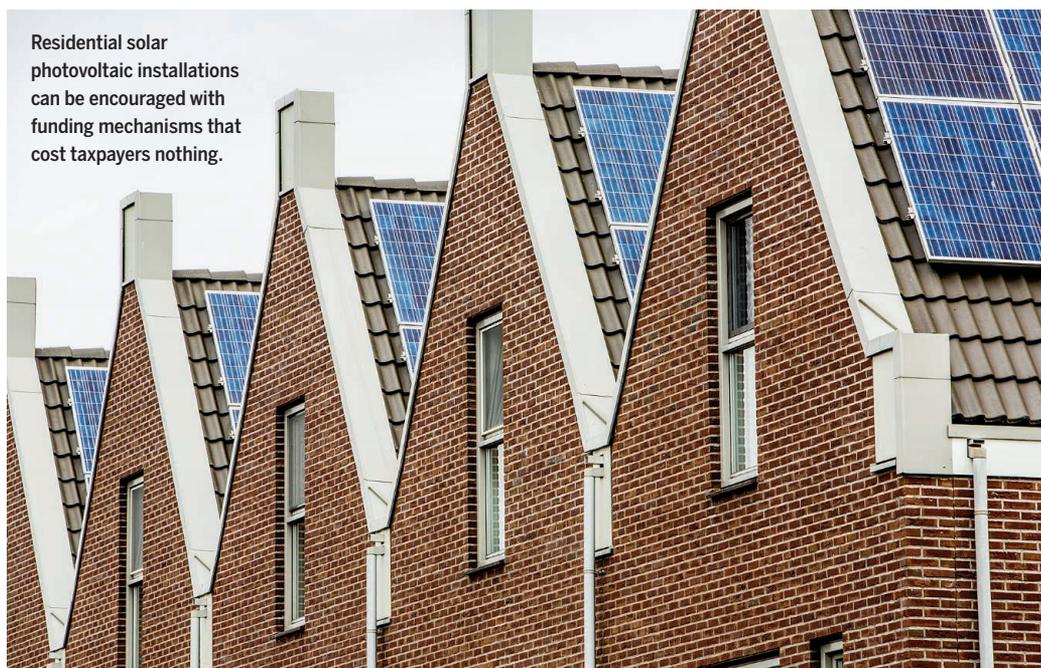
NANOTECHNOLOGY

Nanowarming improves cryopreservation

Organ transplantation is limited by the availability of viable donor organs. Although cryopreservation could extend the time between organ harvest and transplant, the current gold standard for rewarming, convection, leads to cracking and crystallization in samples larger than a few milliliters. Manuchehrabadi *et al.* rewarmed cells and tissues by radiofrequency inductive heating, using magnetic nanoparticles suspended in a cryoprotectant solution. This nanowarming technique rapidly and uniformly rewarmed cryopreserved fibroblasts, porcine arteries, and porcine heart tissue, yielding tissues with higher viability than those rewarmed by convection. —CC

Sci. Transl. Med. **9**, eaah4586 (2017).

Residential solar photovoltaic installations can be encouraged with funding mechanisms that cost taxpayers nothing.



CLEAN ENERGY

The PACE of clean energy development

The Property Assessed Clean Energy (PACE) program is a national initiative designed to promote investment in solar photovoltaics by commercial, nonprofit, and residential property owners. Its central feature is to provide low-cost, long-term funding, which is repaid as an assessment on the property's regular tax bill, as is done for sidewalks and sewers, for example. Spurring such investment clearly is a good goal, but is the program effective? Ameli *et al.* used a natural experiment in northern California to test the capacity of PACE, finding that it has been a great success, more than doubling residential photovoltaic installations in the region at no cost to the taxpayers. —HJS

Appl. Energy 10.1016/j.apenergy.2017.01.037 (2017).

of MAP kinase signaling in the studied cancer cells. PREX is a guanine nucleotide exchange factor for the small guanosine triphosphatase Rac1, best known for its roles in controlling cell motility. The strategy holds promise for the development of cancer therapies directed at specific vulnerabilities of cancer cells. —LBR

Cell 10.1016/j.cell.2017.01.013 (2017).

CANCER

Immunotherapy—the forest and the trees

The clinical success of cancer immunotherapy has been both gratifying and perplexing to immunologists. One unsolved mystery is why fewer than 20% of cancer patients respond to

this treatment. Spitzer *et al.* hypothesized that immune cells influencing the efficacy of immunotherapy reside outside the tumor microenvironment, the focus of most previous research. They used mass cytometry to assess system-wide immune responses that contribute to antitumor immunity in mice treated with immunotherapy. They found that CD4 T cells in peripheral tissues continued to proliferate after tumor rejection and were required for protection against new tumors. These results raise the possibility that therapies exploiting the antitumor activity of CD4 T cells may benefit cancer patients who do not respond to existing immunotherapies. —PAK

Cell 168, 487 (2017).

VERTEBRATE PALEONTOLOGY

Live birth in a new lineage

Live birth has evolved multiple times among vertebrates, most notably in mammals. Although live birth also occurs in some reptiles, including several extinct marine reptiles, it has appeared convincingly to be absent in the Archosauromorphs, the lineage leading to dinosaurs, birds, and crocodiles. Liu *et al.* describe a previously unknown marine Archosauromorph from the middle Triassic in China, *Dinocephalosaurus*, which shows evidence of an embryo within the body cavity. Viviparity in marine animals has clear functional advantages, but the lack of evidence for live birth across millions of years in this large group has caused some to question

whether its evolution was impossible because of some genetic or developmental constraint. This new evidence suggests that, at least initially, this was not the case. —SNV

Nat. Commun. 10.1038/ncomms14445 (2017).

PHYSICS

Signatures of chiral anomaly multiply

Chiral anomaly is one of the most striking phenomena predicted to occur in Dirac and Weyl semimetals. One of its consequences, the decrease in electrical resistance with applied magnetic field, has been observed in several of these materials, but disentangling it from other, less exotic effects is tricky. Working with nanoplates of the Dirac semimetal Cd_3As_2 , Zhang *et al.* observed two additional signatures of the chiral anomaly in nonlocal transport and optical response. The unusual nonlocal transport was caused partly by the diffusion of valley polarization, which in turn was a consequence of the chiral anomaly. These complementary signatures will make it possible to study the phenomenon more closely. —JS

Nat. Commun. 10.1038/ncomms13741 (2017).

ORGANIC CHEMISTRY

Lighting the way to fluorine placement

Fluorination is a powerful strategy to fine-tune molecular properties in pharmaceutical research, but it is often difficult to place the F atoms exactly where you want them. Pitts *et al.* report a photochemical reaction applied to polycyclic terpenoid frameworks that reliably fluorinates C–H bonds three or four carbons away from the oxygen in an enone group. The site selectivity in one case distinguished among 65 different aliphatic C–H bonds. The authors postulate a radical mechanism involving H-atom abstraction by the enone in a triplet excited state. —JSY

J. Am. Chem. Soc. 10.1021/jacs.7b00335 (2017).

Science

The PACE of clean energy development

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DOI: 10.1126/science.355.6328.921-c

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