

ATOMIC GASES

Imaging an atomic soliton train

Solitons—waveforms that keep their shape as they travel—can form in various environments where waves propagate, such as optical media. In a one-dimensional tube of bosonic atoms, solitons are formed when the interaction between the atoms is suddenly switched from repulsive to attractive. This causes the atoms to clump together into a “train” of solitons. Nguyen *et al.* used a nearly nondestructive imaging technique to follow the dynamics of this train. The solitons repulsed each other and underwent collective oscillations known as breathing modes. —JS

Science, this issue p. 422

BATTERIES

Zinc can compete with lithium

Although lithium-based batteries are ubiquitous, there are still challenges related to their longevity and safety, as well as concerns about material availability. Aqueous rechargeable batteries based on zinc might provide an alternative, but they have been plagued by the formation of dendrites during cycling. Parker *et al.* show that when zinc is formed into three-dimensional sponges, it can be used with nickel to form primary batteries that allow for deep discharge. Alternatively, the sponges can be used to produce secondary batteries that can be cycled thousands of times and can compete with lithium ion cells. —MSL

Science, this issue p. 415

PALEOGENOMICS

Ancient genomics of horse domestication

The domestication of the horse was a seminal event in human cultural evolution. Librado *et al.* obtained genome sequences from 14 horses from the Bronze and Iron Ages, about 2000 to 4000 years ago, soon after

domestication. They identified variants determining coat color and genes selected during the domestication process. They could also see evidence of admixture with archaic horses and the demography of the domestication process, which included the accumulation of deleterious variants. The horse appears to have undergone a different type of domestication process than animals that were domesticated simply for food. —LMZ

Science, this issue p. 442

CRISPR TECHNOLOGY

Sensitive and specific CRISPR diagnostics

Methods are needed that can easily detect nucleic acids that signal the presence of pathogens, even at very low levels. Gootenberg *et al.* combined the allele-specific sensing ability of CRISPR-Cas13a with recombinase polymerase amplification methods to detect specific RNA and DNA sequences. The method successfully detected attomolar levels of Zika virus, as well as the presence of pathogenic bacteria. It could also be used to perform human genotyping from cell-free DNA. —LMZ

Science, this issue p. 438

ROBOTICS ARCHITECTURE

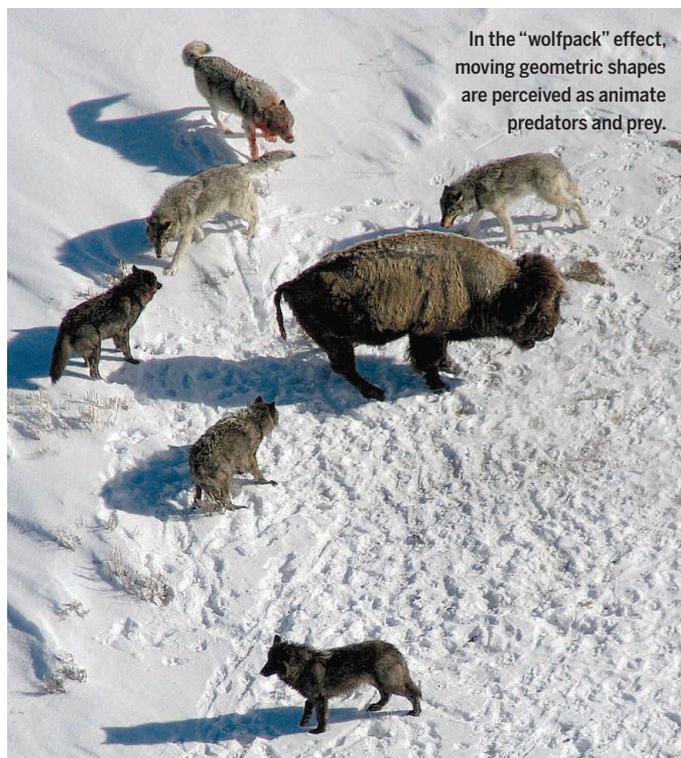
Thinking local about building

Custom manufacturing is commonly associated with small, specialized parts and designs. However, a growing branch of tools is being developed for making much larger buildings and objects. Keating *et al.* successfully built a 15-m open dome structure with a solar-powered array of robotic arms that used sand, compressed earth, ice, recycled plastic, and chains as building materials. The robot used real-time data to adjust its processing, making it adaptable to the local conditions. —MSL

Sci. Robot. **2**, eaam8986 (2017).

IN OTHER JOURNALS

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In the “wolfpack” effect, moving geometric shapes are perceived as animate predators and prey.

PSYCHOLOGY

A privileged status for animate objects

Some stimuli are so important that they capture our attention and influence how we think even when we perform an unrelated task. Moving geometric shapes, especially if moving in what appear to be a self-directed fashion, are invariably perceived to be animate, as though they represent live agents. Using “wolfpack” animations of dart shapes whose points track the movement of a disc (the prey), van Buren and Scholl show that these are more readily remembered than identical animations in which the dart points are oriented away from or perpendicular to the prey. Perceiving such moving shapes as animate reinforces visual memory and has possibly been important in human evolution. —GJC

Cognition **163**, 87 (2017).

CEREBRAL ORGANOIDS

The making of the human brain

The human brain differs greatly from those of other species in the development of a strikingly expanded and extensively folded cerebral neocortex. This feature is considered to underpin humans’ augmented intellectual capacity. Human ventricular

and subventricular zones also contain more radial glial cells and intermediate progenitors than those of other mammals. To investigate the development of cortical folding, Yu *et al.* used a three-dimensional culture system to generate cerebral organoids from pluripotent human stem cells. They found that mutations in growth factor signaling—specifically, deletion

of PTEN activation of the PI3K-AKT pathway—increased cell-cycle reentry and expanded radial glia and intermediate progenitor populations. The resulting neural progenitor proliferation led to expanded and folded cerebral organoids. Inoculation of the organoids with Zika virus impaired cortical growth and folding. —BAP

Cell Stem Cell **20**, 385 (2017).

LOCAL SEA LEVEL

Planning for a rise

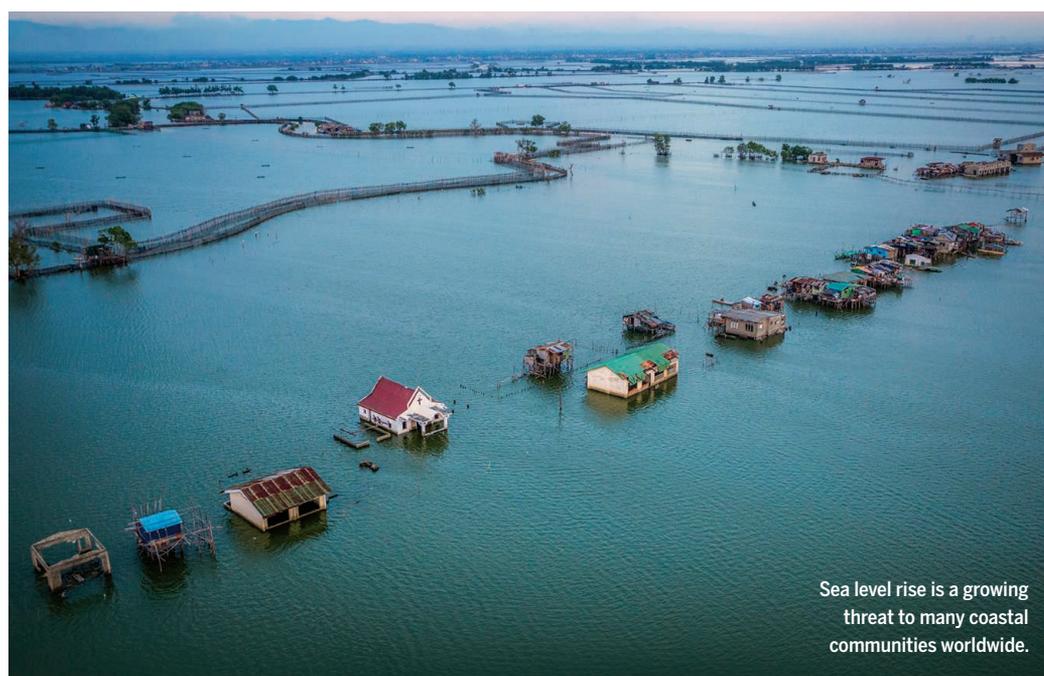
Coastal areas affected by rising seas are subject to regional variations in sea level, as well as the global mean rise. In fact, local effects that occur over decades, rather than centuries, can be several times larger than the global one. Nieves *et al.* provide a tool to help coastal planners estimate the magnitudes of these regional sea level variations. They show that upper ocean temperature is a key indicator of changes in short-term sea level rise over large coastal regions of the United States. This information should enable more informed adaptation over time scales relevant to decision-makers. —HJS

J. Clim. 10.1175/JCLI-D-16-0896.1 (2017).

BIOTECHNOLOGY

Menstrual cycle on a chip

The female reproductive system is dynamic and complex. Various tissues secrete and respond to hormones to coordinate the 28-day menstrual cycle. This normal physiology has been difficult to study, but Xiao *et al.* have replicated the reproductive tract in a microfluidic device that they call EVATAR. The tissue culture–based model supports growth and function of ovary, fallopian tube, uterus, cervix, and liver for up to 100 days. Via interconnected modules, the cultured tissues respond to signals produced by each of the other organ cultures. This tool will provide researchers with exciting opportunities to perform pharmacological and toxicology



Sea level rise is a growing threat to many coastal communities worldwide.

GLOBAL SEA LEVEL

Rise on the rise

One of the most important consequences of global warming is sea level rise, and better determining how fast it is occurring is vital for understanding the climate system and formulating adaptive policy. Dieng *et al.* used 26 separate data sets to determine global mean sea level (GMSL) since October 1992, when satellite altimetry measurements of sea levels began. They find that although the average rate of GMSL rise between January 1993 and December 2015 was close to 3.0 mm/year, the rate was 0.8 mm/year higher during the period 2004–2015 than it was during 1993–2004. Most of that increase was due to mass loss from the Greenland Ice Sheet, but all other components of the budget contributed as well. —HJS

Geophys. Res. Lett. 10.1002/2017GL073308 (2017).

studies on a physiologically relevant model of the human reproductive system. —MKE

Nat. Commun. 10.1038/ncomms14584 (2017).

CELL DEATH

Delaying demise

The final insult during the mammalian cell death process called necroptosis is loss of membrane integrity. What happens next is uncontrolled release of cytoplasmic contents into the extracellular space. Gong *et al.* report that cells can delay this final step by recruiting cellular machinery to generate membrane buds. Execution of necroptosis involves the localization of an enzyme called MLKL (mixed lineage kinase domain-like) to the plasma

membrane. MLKL recruits components of the endosomal sorting complexes required to transport ESCRT-III to the degrading membrane. ESCRT-III sustains membrane integrity by forming membrane blebs, which are eventually shed by the cell. Thus, ESCRT-III recruitment may buy time for the cell to signal to other cells before death. The work also indicates possible interventions to prevent cell death. —LC

Cell **169**, 286 (2017).

ELECTROCHEMISTRY

Virtues of splitting up water-splitting

Widespread use of solar power will require a convenient means of storing energy for use at

night and on rainy days, and making hydrogen fuel from water is a clean prospective solution. Most current approaches split the water into hydrogen and oxygen in the same apparatus, with a membrane keeping the two mutually explosive gases apart. Landman *et al.* instead separated the half reactions entirely, linking the two cells with a pair of nickel-based electrodes of the sort used in rechargeable alkaline batteries. Because these cells require only an electrical connection, the setup could potentially enable centralized hydrogen production powered by far-flung arrays of solar cells where the oxygen would be released. —JSY

Nat. Mater. 10.1038/NMAT4876 (2017).