

PHOTONICS

Practical source of single photons

Single-photon sources are essential for quantum computers that encode information in light. Now, physicists have produced photons with high quality and at high rates.

Chao-Yang Lu and Jian-Wei Pan at the University of Science and Technology of China in Shanghai and their colleagues used a laser to excite an artificial atom in a semiconductor crystal, known as a quantum dot. By using finely tuned laser pulses, they produced individual photons with near-perfect uniformity. They crafted the crystal into a tiny pillar-shaped cavity to maximize the number of photons that escaped.

The device emitted 3.7 million high-quality photons per second — a rate that makes it good enough for practical applications, say the authors.

Another group, led by Pascale Senellart at the University of Paris-Saclay and her colleagues, has achieved comparable success using a similar technique.

Phys. Rev. Lett. 116, 020401 (2016); preprint on arXiv <http://arxiv.org/abs/1510.06499> (2015)

CLIMATE CHANGE

Oceans take a lot of heat

Of the heat taken up by the world's oceans since 1865, nearly half has been absorbed in just the past two decades.

Peter Gleckler at the Lawrence Livermore National Laboratory in California and his colleagues examined data on ocean temperatures from ship-based

measurements dating back to the mid-nineteenth century, and from a near-global network of floating sensors deployed since 2004. They found that most of the heat has accumulated in the upper layer of oceans.

But the data, and model simulations of the full depth of the ocean, suggest that more than one-third of the heat is stored below 700 metres, and this amount is rapidly increasing as Earth's climate warms.

Nature Clim. Change <http://dx.doi.org/10.1038/nclimate2915> (2016)

IMMUNOLOGY

Immune cell goes awry with age

Inflammation increases as the body ages, and one cause could be changes in a type of white blood cell.

Increased inflammation throughout the body is linked to age-related diseases from dementia to heart disease, and growing levels of an inflammatory protein called TNF are a known culprit. Dawn Bowdish at McMaster University in Hamilton,

Canada, and her colleagues studied the effects of TNF in aged mice. They found that the protein boosted the production of immature and dysfunctional monocytes, a type of immune cell, when the mice were infected with the bacterium *Streptococcus pneumoniae*. These immature monocytes drove further inflammation, and the infected animals were less able to rid themselves of the bacteria than were young mice. Blocking TNF in old mice restored this ability. Antibacterial treatments



ESTHER HERRMANN

ANIMAL BEHAVIOUR

Chimp friendships based on trust

Trust does not seem to be unique to humans and may have a long evolutionary history, according to a study in chimpanzees.

Jan Engelmann and Esther Herrmann at the Max Planck Institute for Evolutionary Anthropology in Leipzig, Germany, identified captive chimps (*Pan troglodytes*) that were friends with each other — individuals that frequently groomed and spent time together. The animals were then paired up and each chimp was presented with a choice of two ropes that it could

pull. The 'no-trust' rope gave the chimp a small food reward and left the partner empty-handed. The 'trust' rope gave the partner a reward, part of which could be sent back to the other chimp.

Chimps were more likely to choose the trust rope when paired with friends than with non-friends, showing that trust in close relationships is not unique to humans. The characteristic might have evolved to stabilize social bonds in primates, the authors say.

Curr. Biol. <http://doi.org/bbvs> (2016)

may need to be tailored to the age of the infected person, the authors say.

PLoS Pathog. 12, e1005368 (2016)

ORGANIC CHEMISTRY

Spring-loaded bond adds variety

Chemists have designed a simple way to attach small, strained-ring-shaped chemical groups to potential drug compounds — previously a difficult process.

The structures can change a drug's properties, for example to improve how it is absorbed in the body. Phil Baran at the Scripps Research Institute in La Jolla, California, and his colleagues attached a few such groups — including propellane, which looks like a propeller — to drug molecules by first breaking a high-energy carbon-carbon bond in the ring structure. The team used the energy released from this 'spring-loaded' bond to add another nitrogen-containing molecular group, creating a molecule called an amine. Using their method in a high-throughput synthesis, the team added strained molecules to a range of pharmaceutical compounds.

The team says that scientists in the drug industry have started using the method.

Science 351, 241–246 (2016)

NEUROSCIENCE

Chemical revives neuron function

Treating regenerated nerve fibres with a chemical can restore vision in mice.

After injury, adult neurons regrow their long, signal-conducting axons to form connections called synapses with other neurons. But the regrown cells cannot conduct electrical signals properly. Michela Fagiolini and Zhigang He of Children's Hospital Boston in Massachusetts and their team studied mice with injured optic nerves. Deleting two genes that

regulate neuronal growth, or boosting the production of two protein-growth factors, regenerated retinal axons that formed synapses in the brain, but did not improve vision. Treating the neurons with a compound that improves their conductivity helped them to work properly. This restored vision in six of the eight experimental animals.

The results could help to improve nerve-cell function after an injury, the authors say. *Cell* 164, 219–232 (2016)

PALAEOLOGY

Extinct giraffe was a huge beast

An extinct relative of the giraffe that lived more than 1 million years ago weighed up to 1,800 kilograms, making it one of the largest cloven-hoofed mammals ever to have existed.

Remains of the relatively short-necked giraffid *Sivatherium giganteum* were first uncovered in the 1800s, but until now, nobody had accurately estimated its body mass. Christopher Basu at the Royal Veterinary College in Hatfield, UK, and his colleagues created a 3D model of this giraffid's skeleton (pictured), which indicated that it weighed between 850 and 1,800 kilograms, with males carrying heavy horns.

The team concludes that the creature was not as large as modern African elephants, as was previously suggested,

but it may still have been the largest-ever four-stomached mammal, or ruminant.

Biol. Lett. 12, 20150940 (2016)



SOCIAL SELECTION

Popular topics on social media

Insider view of faculty search

Scientists hunting for academic jobs got a rare glimpse into the mysterious tenure-track hiring process. A blog post written by computational genomicist Sean Eddy at Harvard University in Cambridge, Massachusetts, outlined the steps that he and his colleagues have taken since November to evaluate nearly 200 applicants for a Harvard faculty position. Interviews for six candidates begin this week. A tweet by Eddy on 9 January attracted fresh attention to the blog post, with commenters applauding his efforts to lift the veil on the selection process. Holly Bik, a genomics and bioinformatics researcher at New York University who is applying for jobs, tweeted: "Your blog post is a step in the right direction though; demystifying the black box process is always good."

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ASTRONOMY

Brightest-ever supernova

A supernova has been spotted that is twice as luminous as the previous record holder — at its peak it blazed brighter than 570 billion Suns.

Subo Dong at Peking University in Beijing and his colleagues spotted the exploding star, called ASASSN-15lh, in June last year using an automated telescope survey of the sky. The object belongs to a class of 'superluminous' supernovae that are low in hydrogen. Whereas other hydrogen-poor supernovae reside in dim dwarf galaxies, this one seems to originate near the centre of a massive galaxy that is brighter than the Milky Way.

ASASSN-15lh challenges previous theories of explosion mechanisms and how supernovae are powered, the authors say.

Science 351, 257–260 (2016)

CONSERVATION

Protected areas miss key corals

Only a tiny percentage of the world's corals and tropical fish is safeguarded by current



marine protected areas.

David Mouillot at the University of Montpellier in France and his colleagues compared the geographical range of 805 species of reef-forming hard corals (pictured) and 452 tropical reef fish with a database of more than 3,600 marine protected areas. They then analysed the trees of life of these organisms and found that just 1.7% of the tree's 'branches' for the corals and 17.6% for the fishes had 10% or more of their ranges within the marine protected areas.

Improved conservation strategies are needed to better secure the biodiversity of these animals, the authors say. *Nature Commun.* 7, 10359 (2016)

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