

QUANTUM INFORMATION

Quantum security hacked by light

Ordinary light can break the security of a standard quantum method for sharing private information.

Quantum key distribution allows two people in separate locations to use the rules of the quantum world to create a secret key, which they can use to exchange encrypted messages. But Jan-Åke Larsson at the University of Linköping in Sweden and his colleagues show how to trick one standard method for making such keys. By hijacking the light source that the two parties use to create their shared key, an attacker can control sensitive detectors at either person's location, fooling a security check into believing that no one has meddled with the protocol. The attacker can then intercept messages undetected.

The authors also show how security can be recovered by performing a different test. *Sci. Adv.* 1, e1500793 (2015)

SYNTHETIC BIOLOGY

Designer cells block psoriasis

Engineered cells with synthetic gene circuits can detect and respond to disease biomarkers. These could one day help to treat psoriasis, a chronic inflammatory skin disorder.

Clinical trials have shown that proteins called cytokines can help people who have psoriasis, but the cytokines need to be administered continuously. To overcome this, Martin Fussenegger at the Swiss Federal Institute of Technology in Zurich and his colleagues designed human cells to detect TNF and IL-22, two biomarkers that are associated with flare-ups of psoriasis. When the designer cells detect threshold levels of both biomarkers, they produce the cytokines. Implanting the cells in mouse models of skin inflammation prevented acute disease, improved skin lesions

and restored normal skin. The cells were also responsive to blood samples from people with psoriasis.

Sci. Transl. Med. 7, 318ra201 (2015)

EVOLUTION

Bacteria cannot stop adapting

One of biology's longest-running experiments suggests that adaptation can be endless, even in extremely stable environments.

To test the assumption that evolution is stimulated by environmental change, Richard Lenski at Michigan State University in East Lansing and his colleagues maintained the same populations of *Escherichia coli* in a stable environment for 27 years, freezing samples every 500 generations. They found that populations consistently outcompeted their ancestors, indicating that they were becoming increasingly fit. This continued right up to the 60,000th generation, although the rate of fitness improvement slowed over time.

The results suggest that there is no upper limit to adaptation, even in simple environments. *Proc. R. Soc. B* 282, 20152292 (2015)

INFECTIOUS DISEASE

Emerging virus evolves in camels

Nearly one-fifth of camels in Saudi Arabia harbour a respiratory virus that emerged in 2012 in humans.

Middle East respiratory syndrome coronavirus (MERS-CoV) has infected more than 1,600 people in 26 countries, killing 584. On the basis of previous evidence that camels carry the virus, a team led by Huachen Zhu and Yi Guan at the University of Hong Kong–Shenzhen Branch in China looked for MERS-CoV and related viruses in 1,309 dromedary camels in Saudi Arabia. One in four

SOCIAL SELECTION

Popular topics on social media

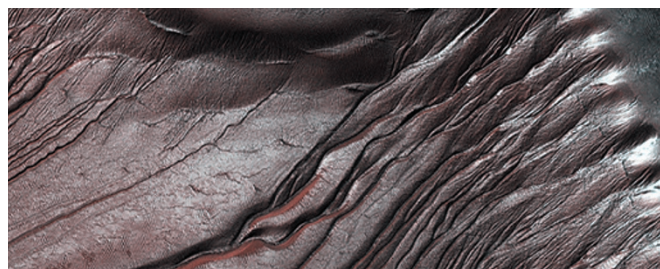
Most-tweeted papers of 2015

The hottest papers of 2015 covered topics ranging from cancer risk to reproducibility in science, according to Altmetric, a London-based company that tracks the media attention received by academic publications. In a paper ranked 9th in Altmetric's annual top 100 list, Leon Gatys at the University of Tübingen, Germany, and his team developed an algorithm that extracts and combines the content of one image with the style of another — turning a photograph into an approximation of a painting by Vincent Van Gogh, for example. The authors write that the algorithm may help to decode how humans create and perceive art. They made the model publicly available,

inspiring others such as Kai Sheng Tai, a data scientist at MetaMind in Palo Alto, California, to create their own versions of the program.

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<http://arxiv.org/abs/1508.06576> (2015)



camels tested positive for human coronavirus genetic material, and nearly 20% carried a MERS-CoV strain. Some animals carried the lineage that caused a South Korean outbreak this year. Further genome sequencing suggested that this lineage emerged in camels between December 2013 and June 2014, after two viruses recombined.

Preventing camel-to-human transmission is the best way to limit the threat of the virus, the authors say.

Science <http://dx.doi.org/10.1126/science.aac8608> (2015)

PLANETARY SCIENCE

No water needed for Mars gullies

Gullies on Mars can be formed by dry carbon dioxide and do not need liquid water.

Planetary scientists have been excited about gullies on Mars's surface (pictured)

because they look like they could have been formed recently by flowing water — possibly making the planet habitable. Cedric Pilorget at Paris-Sud University and François Forget of the Sorbonne Universities in Paris used a numerical model to simulate a layer of CO₂ ice sitting on top of the Martian soil and in pores within it. They calculated that as the Martian winter turns to spring, the ice turns to gas, destabilizing the surface and causing it to crumble and form the gullies.

The work bolsters the idea that many Martian landforms can be created by dry geological processes that do not require water.

Nature Geosci. <http://dx.doi.org/10.1038/ngeo2619> (2015)

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