

Sciencewatch

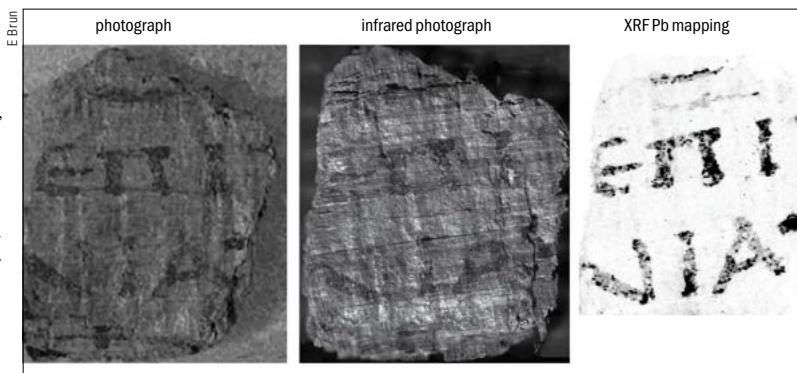
COMPILED BY JOHN SWAIN, NORTHEASTERN UNIVERSITY

Metallic Roman ink

Charred Roman scrolls could now be readable, thanks to the fortunate inclusion of lead in Roman inks. Emmanuel Brun of the University of Grenoble and colleagues have found, using synchrotron X-ray fluorescence, and contrary to what had been thought before, that Graeco-Roman ink was used in two Herculaneum papyrus fragments. This non-destructive technique allows imaging and avoids having to unroll the scrolls, which would likely result in their crumbling to dust.

• Further reading

E Brun *et al.* 2016 *PNAS* Early Edition [pnas.org/cgi/doi/10.1073/pnas.1519958113](https://doi.org/10.1073/pnas.1519958113).



Using synchrotron techniques, a team of scientists has discovered the presence of metal in the ink of two Herculaneum papyrus fragments.

Cold from magnetism

High-current cables can need cooling, but it might be possible to use the magnetic field itself to pull heat away. Luca de' Medici of the European Synchrotron Radiation Facility in Grenoble, France, has pointed out that the Ettingshausen effect could enable this. The idea is to coat the cables with a strong thermomagnetic material like bismuth carrying a small current to pull heat in a direction perpendicular to both the small current and the magnetic field. The effect, while relatively unfamiliar, is analogous to the thermoelectric effect, and can be strong enough to obtain about 60 K cooling for single layers and more than 100 K for double layers. Better thermomagnetic materials could even provide self-cooled superconducting cables that would work at room temperature.

• Further reading

L de' Medici 2016 *Phys. Rev. Lett.* **5** 024001.

Bird language

A bird has been found that uses the order in which notes are combined to express meaning. Toshitaka Suzuki of the Graduate University for Advanced Studies in Hayama, Japan, and colleagues played four notes, A, B, C and D, in different orders to the Japanese greater tit (*Parus minor*). ABC makes the bird scan horizontally for predators, repeated D's attract the bird, ABC-D prompted both responses, but D-ABC was apparently uninteresting.

Efficient wireless power

A new approach to magnetic-resonant wireless-power transfer replaces a wire coil at the transmitter with a high-refractive-index dielectric resonator. Mingzhao Song of ITMO University in St Petersburg and colleagues did numerical work and made a prototype based on exciting the quadrupole mode of a 2 cm-diameter microwave ceramic ball. The dielectric avoids ohmic losses, and the use of the quadrupole mode reduces radiation so that 80% efficiency can be obtained – far higher than the original 45% using metal coils. Rotating the receiver by 90° only reduces the efficiency to 70%. Maybe soon we will be able to throw away our charger cables.

• Further reading

M Song *et al.* 2016 *Appl. Phys. Lett.* **108** 023902.

This species normally uses more than 10 different notes, so this is just a start, but it's the first evidence for "compositional syntax" in a wild animal.

• Further reading

Nature **531** 278 (17 March 2016)
doi:10.1038/531278a.

Clever bamboo

Bamboo is an important fast-growing plant (up to 1 m per day has been recorded),

providing structural material with high stiffness and low weight. Its stems are hollow, so to avoid collapse on bending, it has "nodes" at which stiff diaphragms separate the stem into cylindrical chambers. The nodes are not evenly spaced, and now Hiroyuki Shima of the University of Yamanashi, Japan, and colleagues have made a detailed study of the physics and revealed "the hitherto unknown blueprint of the optimal node spacing used in the growth of wild bamboo" – a novel expression of biological optimisation.

• Further reading

H Shima *et al.* 2016 *Phys. Rev. E* **93** 022406.

Computers suggest experiments

Having trouble thinking of a new and interesting experiment to carry out? How about asking a computer? Mario Krenn of the University of Vienna and colleagues have developed a computer program, MELVIN, which can find new experimental set-ups for how to create and manipulate complicated quantum states. It has already come up with unfamiliar techniques that are not obvious to understand – and which humans might not have come up with using their intuition, which is so rooted in classical physics.

• Further reading

M Krenn *et al.* 2016 *Phys. Rev. Lett.* **116** 090405.

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