

Sciencewatch

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Origin of Hypatia stone questioned

The Hypatia stone, found in western Egypt in 1996, is believed to have formed about 28 million years ago in a meteorite impact. In 2013 it was confirmed to be of extraterrestrial origin and possibly the first sample of a comet nucleus. Now Georgy Belyanin of the University of Johannesburg in South Africa and colleagues have found compounds including polyaromatic hydrocarbons and silicon carbide associated with a nickel phosphide compound not found in the solar system before. Other facts supporting the other-worldly origin of the stone include ratios of silicon to carbon opposite to those



Fragments from the Hypatia stone uncovered in south-west Egypt in the Libyan Desert Glass Field, measuring around 1 cm across.

of the Earth, Mars or Venus, but consistent with interstellar dust, and mineral grains that contain phosphorus and metallic elements not in the ratios expected. The Hypatia stone challenges the generally accepted view of how the solar system was formed and the study of its history continues.

Further reading

G Belyanin *et al.* 2018 *Geochim. Cosmochim. Acta* **223** 462.

Recipes for DNA assembly

DNA can be designed to assemble into specific shapes, but the range of possibilities has been limited – until now. A clutch of papers published in the same issue of *Nature* describe several approaches to making very large structures. Lulu Qian and colleagues at Caltech used simple assembly rules recursively to create 2D arrays with areas up to $0.5 \mu\text{m}^2$, while Peng Yin and team at Harvard University used DNA “bricks” to make 3D nanostructures of more than 10,000 components. Hendrik Dietz and colleagues at the Technical University of Munich, meanwhile, show that large objects can be efficiently assembled in a multi-stage process using DNA building blocks with optimised shape and interaction patterns, also demonstrating a scalable, cost-efficient method for making the required DNA strands. The results make it clear that DNA can be made to self-assemble into a wide variety of large structures with the aim of building synthetic cellular machines for research, engineering and medical applications.

Further reading

G Tikhomirov *et al.* 2017 *Nature* **552** 67; L Ong *et al.* 2017 *Nature* **552** 72; K Wagenbauer *et al.* 2017 *Nature* **552** 78; F Praetorius *et al.* 2017 *Nature* **552** 84.

Equivalence principle in space

The weak equivalence principle, a cornerstone of general relativity, says that all bodies should fall at the same rate. Recent results from the MICROSCOPE satellite, launched in April 2016 and operated by the French space centre CNES, show that this key physics

Topology and water waves

Mysteriously, ocean and atmospheric waves near the equator all share the property that they travel eastwards. Now, Pierre Delplace of the University of Lyon and colleagues have suggested a topological origin to this effect, with time-reversal symmetry broken by Earth's rotation. Remarkably, the work points to a formal analogy between equatorially trapped waves and topological insulators, showing yet another example of the unity of physics.

Further reading

P Delplace *et al.* 2017 *Science* **358** 1075.



principle holds to unprecedented precision. The experiment measured the force needed to keep two similar floating test masses made of different alloys in the same orbit as the satellite completed more than 1500 orbits. No deviation from the equivalence principle was found up to the level of one part in 10^{14} , strongly constraining theories containing very weakly coupled particles.

Further reading

P Touboul *et al.* 2017 *Phys. Rev. Lett.* **119** 231101.

Sound from water to air

Normally, it's all but impossible to hear underwater sounds from above the water surface due to reflection at the interface. By placing a novel metamaterial in contact with the surface, however, Sam Lee of Yonsei University in Seoul and colleagues show that the structure enhances sound by a factor of 160 and allows 30% of the sound energy to get through. The metamaterial is a cylindrical shell with a thin plastic membrane divided into segments and with a mass in the centre, and was designed to respond to sound with secondary waves that interfere destructively, boosting transmission. Possible applications range from better underwater microphones to non-contact ultrasonic imaging.

Further reading

E Bok *et al.* 2018 *Phys. Rev. Lett.* **120** 044302.

Supercool water

Water's complicated phase diagram may need to be updated. Kyung Hwan Kim of Stockholm University and colleagues used femtosecond X-ray laser pulses to probe micrometre-sized water droplets supercooled in a vacuum. Measuring the diameter of the drops as they evaporate and cool, the team found evidence for a supercooled liquid phase at 229 K for water and 233 K for heavy water (consistent with a “Widom line” separating the two liquid phases). Remarkably, water can remain liquid down to -42.55°C .

Further reading

K Kim *et al.* 2017 *Science* **358** 1589.



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