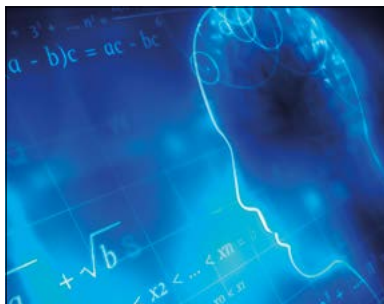


Sciencewatch

COMPILED BY JOHN SWAIN, NORTHEASTERN UNIVERSITY

Mathematics on the brain

Mathematics is often dubbed the language of science, but does mathematical aptitude itself have anything to do with language? To investigate, Marie Amalric and Stanislas Dehaene of the Université de Paris-Sud and Université Paris-Saclay, France, used functional MRI (fMRI) imaging to image the brains of professional mathematicians and non-mathematicians of equal academic standing when asked questions about the truth or falsity of mathematical and non-mathematical statements. Among the professional mathematicians, fMRI clearly showed activation in the bilateral frontal, intraparietal and ventrolateral



New study probes the relationship between mathematics and language.

temporal regions – regardless of whether the questions concerned algebra, analysis, topology or geometry. Intriguingly, the subjects did not rely on areas of the brain that relate to language and general-knowledge semantics, and instead used areas that were activated by numbers and formulae in the non-mathematician group. This, claim the authors, suggests that high-level mathematical expertise and basic number sense share common roots in a non-linguistic brain circuit.

● Further reading

M Amalric and S Dehaene 2016 *PNAS* **113** 4909.

Chirality detected in deep space

Chiral molecules, which cannot be superimposed on their mirror image, are a key feature of biological life on Earth and have already been detected in other solar-system objects. Now, for the first time, a chiral molecule has been detected in interstellar space. Brett McGuire of the National Radio Astronomy Observatory in the US and colleagues used data from the Green Bank Telescope in West Virginia, with some help from the Parkes radio telescope in Australia, to detect propylene oxide near the centre of our Galaxy in the star-forming dust and gas cloud Sagittarius B2. The identification was made via multiple spectral lines, but the data did not allow the team to determine the molecule's absolute handedness. The result should help in the ongoing struggle to understand the origin of the bimolecular chirality that is so important to life as we know it.

● Further reading

B McGuire *et al.* 2016 *Science* **352** 1449.

Bio-inspired robotic fish

Batoid fishes, which include stingrays, have served as inspiration for a bizarre robot that is a hybrid of machines and living cells. Kevin Kit Parker of Harvard University and colleagues put living muscle cells from a rat's heart on an elastomeric body enclosing a microfabricated gold skeleton, so that the structure could mimic the undulating

Feathers in amber

Plumage in the Cretaceous period, which holds important evolutionary clues, is notoriously difficult to study due to the poor preservation of details in compression fossils. Fortunately, however, two ancient bird wings trapped in Burmese amber 99 million years ago have been found in which feathers have been preserved in stunning detail. The samples have allowed Lida Xing of the China University of Geosciences in Beijing and colleagues to make detailed studies, for example using synchrotron X-ray micro-CT techniques, to reveal the first examples of several physiological structures – including follicles and feather tracts – that until now have not been preserved. The feathers are likely to be from hatchlings of enantiornithines, a group of extinct flying dinosaurs.

● Further reading

L Xing *et al.* 2016 *Nature Communications* **7** 12089.



A mummified partial wing preserved in a few cubic centimetres of amber, revealing rachis, skin, muscle and claw.

swimming motion of a batoid fish. The muscle cells, which were genetically engineered to contain an optogenetic molecular switch, were controlled externally via an optical signal. The artificial animal, which replicated fish morphology at the 1/10th scale (corresponding approximately to the size of a one-cent coin) including the basic fin deflection patterns of batoid fish, uses these light cues to navigate simple obstacle courses.

● Further reading

S-J Park *et al.* 2016 *Science* **353** 158.

Burying carbon dioxide

Carbon capture and storage (CCS) technologies aim to reduce harmful carbon-dioxide emissions by diverting them underground, rather than into the atmosphere. Now, for the first time, Juerg Matter of the University of Southampton in the UK and colleagues have shown that carbon dioxide can be disposed of permanently by being mineralised to benign carbonate minerals in basaltic rocks. The team found that it took less than two years for more than 95% of the carbon dioxide injected into the CarbFix site about 25 km from Reykjavik in Iceland to be immobilised this way. Previously, it was thought that such processes take several hundreds to thousands of years, and the results therefore hold promise for CCS solutions.

● Further reading

JM Matter *et al.* 2016 *Science* **352** 1312.

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