# RESEARCH HIGHLIGHTS

*Selections from the scientific literature*

QUANTUM INFORMATION

## Qubit control in a 3D matrix

Qubits — quantum bits which store and process information in quantum computers — can be controlled individually in a 3D structure without disturbing nearby atoms.

Neutral atoms show promise as qubits when they are cooled and trapped by light, but manipulating one atom without disturbing its neighbours is difficult. David Weiss and his team at Pennsylvania State University in University Park controlled a single atom in a 5×5×5 array of trapped caesium atoms by firing two beams of circularly polarized light so that they intersected at the target atom. This caused the energy levels of electrons in the atom to shift, allowing the researchers to change its quantum state by hitting it with microwaves.

The method should make it easier to scale up quantum computers that use this kind of qubit, the researchers say.

***Phys. Rev. Lett.*** 115, **043003 (2015)**

SCOTT M. BOBACK

ANIMAL BEHAVIOUR

## How boa constrictors really kill

Animals that have been squeezed to death by snakes probably die of circulatory arrest rather than of suffocation as was thought.

Scott Boback at Dickinson College in Carlisle, Pennsylvania, and his team anaesthetized rats and implanted probes and catheters to measure their heart rate, blood pressure and blood chemistry as the animals were being squeezed by a boa (*Boa constrictor*; pictured). Constriction lasted an average of 6.5 minutes, but the rats' peripheral blood pressure dropped by half as early as 6 seconds in. By the end of constriction, the rats' blood chemistry showed signs of system-wide circulatory problems and there was evidence that the heart had undergone significant electrical dysfunction.

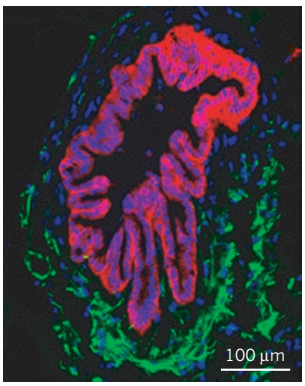
The authors suggest that snakes may release their prey only after detecting that it has experienced irreversible heart failure.

***J. Exp. Biol.*** 218, **2279–2288 (2015)**

STEM CELLS

## Stomach tissue made in a dish

Mouse embryonic stem cells can develop into 3D 'mini stomachs' in the lab.




TAKA-AKI K. NOGUCHI *ET AL./NATURE CELL BIOL.*

Researchers have previously used stem cells to make parts of the stomach, but not the whole organ. Taka-aki Noguchi, Akira Kurisaki at the University of Tsukuba in Japan and their team made stomach tissue — including the main food-containing part — by adding several key growth factors to the stem-cell culture after six days. These turned on expression of the *Barx1* gene, which is essential for stomach development. After about 60 days, the cells developed into stomach tissue (**pictured**) that contained several specialized types of stomach cell. The mini stomach also secreted a digestive hormone and acid, and had a similar gene-expression profile to that of adult stomach tissue.

This system could be used to study stomach diseases, the authors say.

***Nature Cell Biol.*** **http://doi.org/6gf (2015)**

**For a related News Feature on organoids, see page 520.**

NEUROBIOLOGY

## Marijuana's good without the bad

Mice treated with marijuana's active component, THC, along with other key molecules, can experience its pain-relieving benefits without the usual memory impairments.

THC binds to the CB1 cannabinoid receptor in the brain, causing negative effects such as poor memory and anxiety. However, it also affects behaviours that are regulated by the serotonin 2A receptor. Patricia Robledo at Pompeu Fabra University in Barcelona, Spain, and her colleagues gave THC to mice lacking the serotonin receptor, and found that the animals did not show signs of memory loss but could still tolerate painful stimuli. Studies of cells expressing both types of receptors revealed that the receptors physically