

BIOGEOCHEMISTRY

Methane's great Arctic escape

Methane is moving from thawing Arctic soils into lakes and could be released into the atmosphere. Methane is a potent greenhouse gas, so this mechanism might exacerbate future Arctic warming.

A team led by Adina Paytan of the University of California, Santa Cruz, found that levels of methane were higher in soils around Toolik Lake, Alaska, than in the lake water itself. Geochemical measurements suggested that the methane is transported from the soil's active layer, which freezes and thaws every year, into the lake and then into the atmosphere.

If that pattern holds true for other northern lakes, soil could have a bigger role in sending methane into Arctic air than previously thought.

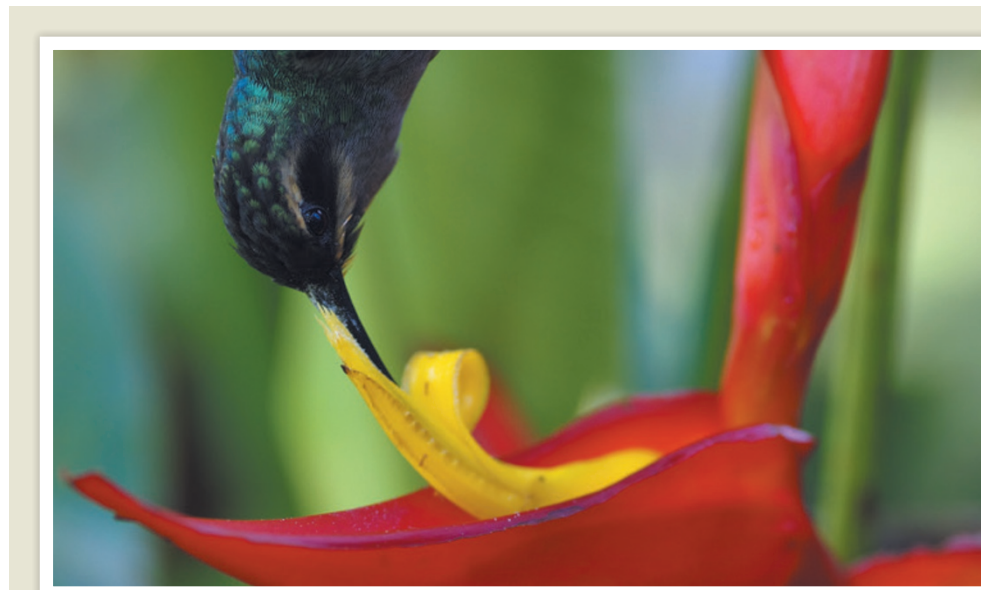
Proc. Natl Acad. Sci. USA <http://doi.org/2sh> (2015)

NEUROSCIENCE

Nanoparticles turn on neurons

Gold nanoparticles can be attached to neurons and used to stimulate the cells, without introducing any genes.

Current 'optogenetic' methods use light to excite specific neurons, but genes must first be inserted into the cells to make them sensitive to light. To develop an alternative method, Francisco Bezanilla at the University of Chicago in Illinois, David Pepperberg at the University of Illinois at Chicago and their colleagues used molecules including antibodies to attach 20-nanometre-wide gold spheres to three different ion channels on the surface of cultured neurons. When



MATT BETTS

ECOLOGY

Flowers choose the best pollinators

A tropical flower can turn on reproduction after it has been visited by a high-quality pollinator.

Matthew Betts of Oregon State University in Corvallis and his colleagues focused on the plant *Heliconia tortuosa* (pictured) and collected 148 of its pollinators, comprising six hummingbird species and one species of butterfly. The animals were cleaned of any pollen and introduced to aviaries containing flowers that had been hand-pollinated. The plants showed signs of successful reproduction

only after their nectar had been drunk by hummingbird species with long curved beaks, such as the green hermit (*Phaethornis guy*; pictured). Hummingbirds without the specialized bills and butterflies took in less nectar and failed to trigger reproduction.

Preferred birds also have the widest ranges, suggesting that the plants are boosting their chances of receiving pollen from distant flowers with more genetic diversity than nearby plants.

Proc. Natl Acad. Sci. USA <http://doi.org/2sf> (2015)

the researchers flashed a millisecond pulse of light, the gold heated up, causing most of the neurons to fire. The same thing happened when they injected the nanoparticles into a specific region of a mouse brain slice.

Neuron <http://doi.org/2sj> (2015)

MATERIALS

Liquid metal motor moves by itself

A tiny drop of liquid metal can propel itself for more than an hour without external help.

Millimetre-scale motors

could find uses as sensors, pumps and drug carriers, but they often require external drivers such as electric fields. Jing Liu and his colleagues at Tsinghua University in Beijing created a 60-microlitre liquid-metal motor that drove itself at around 5 centimetres per second by 'eating' aluminium.

The team applied flakes of aluminium to droplets of an alloy of gallium and indium. A chemical reaction between the aluminium, the alloy and a surrounding electrolyte propelled the metal beads around a Petri dish or through zig-zag and U-shaped channels.

The authors say that the work is a step towards creating a self-powered soft robot that can change shape according to its environment.

Adv. Mater. <http://doi.org/f26cb6> (2015)

NANOMATERIALS

Self-cleaning paint works in oil

A coating that can be easily applied to various surfaces repels water and dirt, even when exposed to oil.

Other water-repellent paints stop working in oil and are