RESEARCH HIGHLIGHTS

Selections from the scientific literature

PHYSICS

Tractor beam pulls in objects

An array of ultrasound beams can drag centimetre-sized objects towards it.

Mike McDonald at the University of Dundee, UK, Gabriel Spalding at Illinois Wesleyan University in Bloomington and their colleagues sculpted interference patterns in the array so that much of the acoustic energy bounced off the sides or rear of an object in front of the array. This drove the object towards the ultrasound sources. The effect has been previously shown with light waves, but sound waves can move larger objects.

Such control might prove useful in non-invasive surgery: for example, it could be used to manipulate drug-delivery packages inside the body or to precisely cut out tumours.

Phys. Rev. Lett. 112, **174302 (2014)**

GEOPHYSICS

How El Niño slows the planet's spin

The El Niño Pacific weather event affects how long the day is, but two types of El Niño do this in two different ways.

Weather changes affect the planet's rotation speed, and thus day length, by changing the atmosphere's pressure over topographical features. A team led by Olivier de Viron, now at the University of La Rochelle in France, studied atmospheric behaviour between 1948 and 2013.

The researchers found that when El Niños make Pacific waters warmer in the east, they set up strong pressure gradients above big mountain ranges (such as the Andes) that increase the time it takes the planet to spin by slightly more than 0.1 millisecond. By contrast, El Niños with warmer central Pacific waters produce only about half as much Earth-changing drag.

Geophys. Res. Lett. **http://doi.org/snq (2014)**

ROGER T. HANLON

ANIMAL BIOLOGY

Injury shapes squid behaviour

Squid that are sensitized to pain by injury are quicker to flee from predators, showing an adaptive benefit to injury and pain.

Robyn Crook and Edgar Walters of the University of Texas Medical School at Houston and their colleagues took several squid (*Doryteuthis pealeii*; pictured) and inflicted a minor injury on one arm of each animal. When exposed to black sea bass, the previously injured squid fled or hid from these predators earlier than uninjured animals. But squid that were treated with anaesthetics before the injury, and so did not develop neural sensitization, failed to change their behaviour. As a result, these animals were less likely to survive encounters with the predator than injured individuals that were not anaesthetized. This is the first experimental evidence that pain-like neural sensitization is an adaptive response to injury, the authors say.

Curr. Biol. **http://doi.org/sp8 (2014)**

ECOLOGY

Longlines better for deep seas

Fishing with longlines has little effect on the vulnerable ecosystems of the deep sea, according to Telmo Morato and his team at the University of the Azores in Horta, Portugal.

Deep-sea fishing practices such as trawling have proved controversial owing to concerns about damage to slow-growing species at the bottom of the ocean. The researchers studied data from longline fishing, a technique that uses one main line with many shorter, hooked lines attached, around the Azores islands, and compared them to published data on the effects of bottom trawling. They estimate that between 4,000 and 23,000 longline deployments would be needed to remove 90% of cold-water corals in a given area, compared with just 13 trawls.

Regulated longline fishing could be a more sustainable method of deep-sea fishing than trawling, the authors suggest.

Sci. Rep. 4, **4837 (2014)**

ATMOSPHERIC SCIENCE

Detecting rainfall from the bottom up

A method that allows researchers to estimate global rainfall levels using soil-moisture data could help to improve hazard planning for floods and landslides.