

Sciencewatch

COMPILED BY JOHN SWAIN, NORTHEASTERN UNIVERSITY

How do fish hide?

Many fish have metallic-looking reflective scales due to plates of guanine, and it had been thought that the mirror-like finish was all there was to their camouflage, but it turns out that they work more subtly. Parrish C Brady of the University of Texas at Austin and colleagues studied more than 1500 video-polarimetry measurements from live fish in distinct habitats and under different viewing conditions, and the researchers have

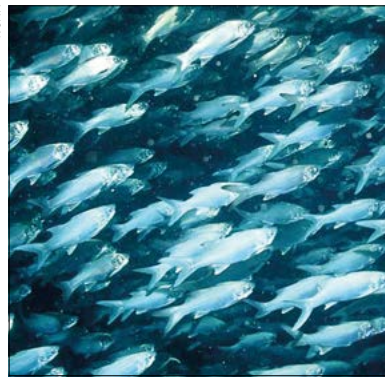
shown that the fish adjust the reflection to take into account the highly variable degree of light polarisation in the open ocean, with optimal camouflage at angles associated with predator detection and pursuit.

● Further reading

PC Brady *et al.* 2015 *Science* **350** 965.

Fish use light reflection to hide.

NOAA



Worms that heal

A carcinogenic parasitic worm could do a lot of good one day. Michael J Smout of James Cook University in Queensland, Australia, and colleagues were looking at the oriental liver fluke *Opisthorchis viverrini*, which infects around 10 million people in Thailand and Laos who pick it up from eating contaminated raw fish. The parasitic worm can stay in the host's liver for decades, eating the liver but, it seems, patching it up with growth-factor Ov-GRN-1, which it secretes as it goes along. This keeps the host alive until the cumulative damage and inflammation causes bile-duct cancer, resulting in 26,000 deaths per year. The upside is that Ov-GRN-1 accelerates healing and blood-vessel growth in mice, and holds promise for helping the impaired healing of diabetic and elderly patients. Understanding it may also lead to a vaccine for people who have the parasite.

● Further reading

M J Smout *et al.* 2015 *PLOS Pathogens* [dx.doi.org/10.1371/journal.ppat.1005209](https://doi.org/10.1371/journal.ppat.1005209).

Fröhlich state finally seen

In 1968, Herbert Fröhlich predicted an analogue of Bose–Einstein condensation in biological macromolecules with a range of vibrational frequencies, which could lead to a macroscopic condensation of energy into the lowest-frequency mode. This would be remarkable not only for its appearing in a biological context, but also for not requiring low temperatures. Now, Gergely Katona of the University of Gothenburg in Sweden and colleagues have finally shown this condensation in a crystallised egg protein (lysozyme) subjected to 0.4 THz radiation.

How the Moon got its tilt

The origin of the Moon has long been a matter of speculation, with the prevailing idea being that a Mars-sized planet hit the Earth and ejected the material that formed the Moon. The trouble is that models suggest that the Moon should not be tilted more than about 1° from the plane of the Earth's orbit around the Sun. It's actually about 5°, and would have been twice that 4.5 billion years ago.

Now, Kaveh Pahlevan and Alessandro Morbidelli of the Université Côte d'Azur in Nice, France, have pointed out that if there were a direct hit of the kind described, one might expect a lot of near misses with significant gravitational interactions. Starting with an early solar system made of lots of miniplanets between 0.1 and 1 lunar mass (a popular model), a 10° tilt or more comes out as quite reasonable. The theory would also explain why we have so many heavy metals such as gold close to the surface (not having fallen into the molten core), because smaller objects hitting the Earth could deliver them, so this would solve a second mystery at the same time.

● Further reading

K Pahlevan and A Morbidelli 2015 *Nature* **527** 492.

X-ray crystallography shows a non-thermal change in electron density with a micro- to millisecond thermalisation timescale, which can only be explained by Fröhlich condensation. This is the first experimental confirmation of the effect, and may have far-reaching implications for biology.

● Further reading

IV Lundholm *et al.* 2015 *Struct. Dyn.* **2** 054702.

Eyes in the armour

Chitons – *Acanthopleura granulate* – are marine molluscs with hard shells. Remarkably, they also have up to 1000 eyes, each a little smaller than a printed period, but there had been doubts as to their degree of functionality. Christine Ortiz of MIT, US, and colleagues demonstrated that they can indeed form images and have photosensitive cells below them forming a sort of retina. They also found that the lenses are made of large crystallographically aligned grains of the same material that makes up their armour: aragonite, a form of calcium carbonate (the other natural form being calcite).

● Further reading

LLi *et al.* 2015 *Science* **350** 952.

Cooler distillation

A breakthrough in distillation uses light to heat an ethanol and water mixture far more efficiently. Naomi J Halas and colleagues at Rice University in Houston put gold–silica nanoparticles into the mixture and shone laser light from above – a sharp break from the usual technique, which heats from below (which, once it's been said, makes one wonder why this wasn't thought of earlier!). Local heating drives off the ethanol preferentially with less heat wasted. There's a nice plus, which is that optical distillation avoids getting stuck with an azeotropic mixture, which normally limits alcohol concentration to 95%, and 99% can be easily achieved.

● Further reading

O Neumann *et al.* 2015 *Nano Lett.* [dx.doi.org/10.1021/acs.nanolett.5b02804](https://doi.org/10.1021/acs.nanolett.5b02804).

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Oerlikon Leybold Vacuum GmbH

Bonner Strasse 498

D-50968 Köln

T +49 (0)221 347-0

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info.vacuum@oerlikon.com

www.oerlikon.com/leyboldvacuum

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