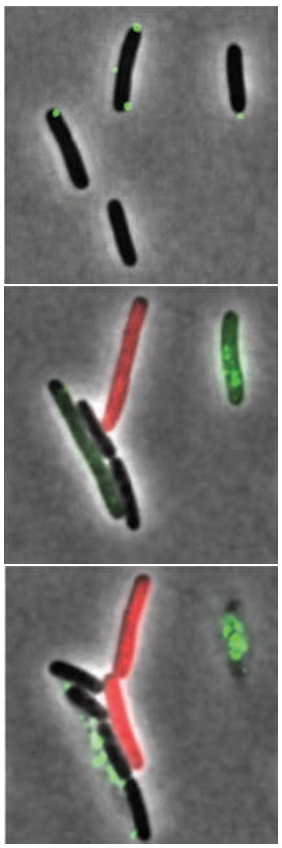
CELL BIOLOGY

Viral vote

Cell **141,** 682–691 (2010)

Why do identical cells often respond differently to the same stimulus? Researchers generally blame noise inherent in biological systems, but there may, in fact, be specific processes at play, according to Ido Golding, now at Baylor College of Medicine in Houston, Texas, and his co-workers.

They watched individual particles of a bacterial virus infect single *Escherichia coli* cells (pictured, top panel, green dots indicate virus particles) — in theory subjecting the cells to the same stimulus. Each virus particle, they found, makes an individual 'decision': to kill the host cell or to become dormant by integrating into the host's DNA. Those decisions are then summed to determine the cell's ultimate fate. Only a unanimous decision by all virus particles to integrate into the DNA of a particular cell keeps that cell alive (red). If even one particle 'votes' for death, the cell bursts (bottom panel, in green). **A.K.**



ELSEVIER

NEUROSCIENCE

Bright eyed

Sci. Transl. Med. **2,** 31ra33 (2010)

Light is an important regulator of the body's circadian rhythms. In humans, this is thought to be mediated by light-sensing cells in the eye known as intrinsically photosensitive retinal ganglion cells (ipRGCs). Steven Lockley at Brigham and Women's Hospital in Boston, Massachusetts, and his team have shown that the retina's colour-detecting cones are also involved.

They shone blue or green light of varying intensities directly into the eyes of awake volunteers for 6.5 hours during the night. Cones are most sensitive to green light, whereas ipRGCs mainly detect blue light. The researchers also monitored changes in the volunteers' circadian responses.

The team found that cones contribute to circadian responses on initial exposure to light and in dim light conditions, but that ipRGCs are the main photoreceptors when light is bright and long-lasting. The authors suggest their findings could help enhance light therapy for conditions such as sleep disorders. **C.L.**

PHYSICS

Not a WISP of evidence

Phys. Lett. B doi:10.1016/j.physletb.2010.04.066 (2010)

In extensions to the standard model, which describes the fundamental particles and forces of physics, some theorists have proposed the existence of very light subatomic particles called WISPs. These could be dark matter, which keeps a spinning galaxy from flying apart.

One way to detect WISPs would be to look for the rare conversion of light particles to WISPs, and later back to photons. In between these conversions, a WISP could zip through any barrier. So Axel Lindner at DESY, the German electron synchrotron in Hamburg, and his colleagues shone green laser light at a 'wall', a thick piece of light-absorbing material, hoping that a few photons might pop out the other side. They increased the chances of a WISP conversion by using optical resonators to boost the power of the laser light and by applying a strong magnetic field. But the researchers did not detect any emerging photons, limiting the chance of a WISP conversion to nearly 1 in 10^{25} — the most sensitive limit yet. **E.H.**

MICROBIAL GENOMICS

A happy marriage

PLoS Genet. **6,** e1000943 (2010)

Poplar trees may not be the first plants to spring to mind when thinking of biofuels, but they are a potentially important feedstock, partly because they can grow on soils unsuitable for food crops.

To see how poplar growth could be improved, Daniel van der Lelie at the Brookhaven National Laboratory in Upton, New York, and his colleagues analysed the genome and metabolites of the microbe *Enterobacter* sp. 638, which lives naturally inside poplars and increases the plant's growth by as much as 40%.

Among the key genes identified in the bacterium are those encoding enzymes involved in the production of plant growth hormones. This hormone production depends, in turn, on the presence of compounds such as sucrose synthesized by the plant, showing how much the bacterium and tree depend on each other. **L.O.-S.**

JOURNAL CLUB

Marc Vrakking
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A physicist discusses how to visualize a molecule changing shape.

It is the dream of many a chemist to watch a movie of a molecule undergoing structural change. So how can we achieve this? One way is to use the relationship between a molecule's absorption spectrum and its structure to deduce how the structure changes over time. However, a drawback of this technique is its reliance on prior knowledge of the molecular absorption spectrum.

Faton Krasniqi at the Max Planck Advanced Study Group in Hamburg, Germany, and his co-workers present an alternative idea: using photoelectrons ejected from molecules excited by X-ray free-electron lasers to determine molecular structures that change over time (F. Krasniqi *et al. Phys. Rev. A* **81,** 033411; 2010).

They explain how electrons that are ejected and directly detected without any further interaction with the molecule interfere with electrons that scatter off the surrounding atoms in the molecule, thereby creating holographic patterns. These patterns encode the molecule's three-dimensional structure. As an example, the researchers present calculations through which they reconstruct the six-membered phenyl ring in a chlorobenzene molecule.

This approach of holographic structure retrieval promises powerful insight into time-dependent molecular dynamics in the next few years. It is an idea that is well founded in earlier experiments at synchrotrons. Many of the required experimental techniques — such as the ability to position molecules in space using moderately intense laser fields — have recently been demonstrated. The Linac Coherent Light Source (LCLS), an X-ray free-electron laser at Stanford University in California, has been up and running since last year. Now it's showtime!

Discuss this paper at **go.nature.com/KzvyE9**