

valid, and that the dominant mechanism depended upon the number of defects in a structure. The team was also able to manipulate the origin of the light by controlling the number of defects.

### SYSTEMS BIOLOGY

## A powerhouse dissected

*Nature Biotechnol.* doi:10.1038/nbt1387 (2008)  
A compendium detailing how an organelle involved in cellular energy production responds to a catalogue of compounds, two-thirds of which are marketed drugs, has been made freely available online.

Vamsi Mootha at Harvard Medical School in Boston and his colleagues developed a rapid technique for monitoring changes in the activity of mitochondria in cultured muscle cells in response to almost 2,500 compounds. They also measured alterations in the expression of 25 genes involved in the organelle's function.

People with heart disease are often prescribed propranolol to treat high blood pressure, and statins to lower cholesterol. The researchers found that when propranolol is applied to cell cultures in combination with several statins, this can drastically reduce mitochondrial function. This may explain why some people who take statins experience muscle pain.

### ANTHROPOLOGY

## An infectious idea

*Proc. R. Soc. B* doi:10.1098/rspb.2008.0094 (2008)  
Historical patterns of the prevalence of nine major infectious diseases predict some social attitudes in today's societies better than do contemporary patterns of illness. This finding, from Corey Fincher at the University of New Mexico in Albuquerque and his

colleagues, lends weight to the idea that certain social attitudes — such as distrust of outsiders, or high regard for behavioural conformity (pictured, right) — develop in response to disease.

The authors compare historical data on pathogen distribution with several surveys of cultural attitudes. They also factor in an analysis that statistically controls for other likely predictors, including income and inequality, to support a causal link between historical pathogens and cultural values.

### QUANTUM PHYSICS

## Magnetic gas

*Nature Phys.* doi:10.1038/nphys887 (2008)  
Bose–Einstein condensates are weird clumps of extremely cold atoms. Normally, the condensates are made of atoms that interact with only neighbouring atoms, bouncing off each other like billiard balls. A team of physicists at the University of Stuttgart in Germany has now demonstrated that they can make stable clumps with long-range interactions.

Tobias Koch and his colleagues made a Bose–Einstein condensate by cooling a gas of chromium-52 to just above absolute zero. The atoms of this condensate had strong magnetic dipoles, and the team applied an external magnetic field to eliminate contact forces between the atoms. This left only the interaction between the magnetic dipoles.

Because the dipoles have a preferred direction, these clumps of atoms are only stable in certain configurations.



G. C. HIN/AF/GETTY

### METEOROLOGY

## Bacteria make rain

*Science* 319, 1214 (2008)  
Fresh snow contains a surprisingly large amount of cells or cell fragments, a team of researchers has found. For the ice crystals that produce rain and snow to form, the high atmosphere must contain tiny particles on which moisture can condense.

Brent Christner of Louisiana State University in Baton Rouge and his colleagues sampled fresh snow collected at mid and high latitudes in North America, Europe and Antarctica. They found small amounts of biological ice nucleators in all of the samples, indicating that snow- and rain-making particles, such as certain plant pathogens, are able to travel long distances and that their effect on precipitation is not limited to vegetation-covered regions.

Health and plant growth have been linked to atmospheric processes, so changes in forestry or agriculture may have a large and direct impact on global precipitation, the authors add.

## JOURNAL CLUB

**Keith Devlin**  
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**A mathematician considers the early signs of mathematical ability.**

Have you ever wondered whether there is any reliable way to predict whether a three- or four-year-old child will be good at mathematics when he or she goes to school? Many people find it surprising that an early aptitude for arithmetic is

not a terribly good indicator.

A 2004 paper by the psychologist Daniela O'Neill and her colleagues at the University of Waterloo in Ontario, Canada, suggested something better. O'Neill and her team showed three- and four-year-old children a picture book and asked them to tell a story about what they saw. The researchers then measured many parameters of the children's storytelling, including the diversity of vocabulary used and the length of the sentences constructed. Two years later, the team set the same children various tests of academic

achievement (D. K. O'Neill *et al.* *First Lang.* 24, 149–183; 2004).

O'Neill and her co-workers found that vocabulary and sentence length in the initial study bore little relation to the test performances a couple of years later. However, the sophistication with which the children told their stories was important. The most significant feature of this sophistication was children's ability to switch perspectives as they related the stories. Crucially, the correlation that the researchers found pertained not to later performance in

reading, spelling or general knowledge, but to future mathematical ability.

I have long thought that the human capacity for mathematical thinking must predate symbolic arithmetic, because numbers are a relatively recent invention. This study backs up this idea, because it suggests that the ability to solve mathematical problems has co-opted other innate capacities that have been important for much longer in our evolution.

Discuss this paper at <http://blogs.nature.com/nature/journalclub>