T790M in the gene *EGFR*. Franziska Michor at the Dana-Farber Cancer Institute in Boston, Massachusetts, William Pao at the Vanderbilt-Ingram Cancer Center in Nashville, Tennessee, and their team cultured resistant and non-resistant cells and found that those with the T790M mutation grew more slowly than drug-sensitive cells. Populations containing resistant cells also regained sensitivity when drug treatment was withdrawn. This, along with data from clinical trials, led the authors to suggest that some resistant tumours still contain drug-sensitive cells that can repopulate the tumour when a drug is taken away.

The authors incorporated these data in a mathematical model to predict tumour behaviour. They estimate that, after drug withdrawal, an *in vitro* population in which 87.5% of cells are resistant would take 35–40 days to shift to just 1% resistant cells. They propose adding a weekly high-dose drug pulse to the daily low-dose regimen to delay resistance.

Sci. Transl. Med. 3, **90ra59 (2011)**

MATERIALS SCIENCE

Phase-shifters magnified

Some solids naturally fluctuate between two structural forms; now researchers have followed such a transformation directly at atomic resolution in a copper sulphide nanorod. Understanding this process at the atomic scale might lead to the rational design of novel materials that exploit such transformations, such as memory-storage materials.

Haimei Zheng and Paul Alivisatos at the Lawrence Berkeley National Laboratory in Berkeley, California, and their colleagues used high-resolution transmission electron microscopy to watch copper sulphide nanorods oscillate between two solid-phase structures when heated by an electron beam. The transition occurred just above room temperature, and the material oscillated a number of times before its structure reached a stable configuration. Defects in the material strongly influenced the dynamics of the transformation by partitioning the nanorod into different domains, each with a different oscillation frequency.

Science 333, **206–209 (2011)**

IMMUNOLOGY

Virus detected upon entry

Retroviruses such as HIV are notorious for their ability to dodge the mammalian immune system, but researchers have pinpointed a mechanism by which retrovirus-resistant mice detect and respond to retroviral infection.

The body's innate immune system detects pathogens using specific receptors, which then trigger the antibody and cellular responses. Tatyana Golovkina at the University of Chicago, Illinois, and her team infected retrovirus-resistant mice with mouse retroviruses. Virus that had been irradiated with ultraviolet light — and had thus been rendered incapable of replicating — was just as able to elicit an antibody response as nonirradiated virus, suggesting that viral entry is enough to trigger the response.

The authors then homed in on the receptor that senses the viral RNA: TLR7. They suggest that virus-sensing occurs in the cell's endosomes — membrane-bound compartments in which TLR7 resides.

Immunity **doi:10.1016/j.immuni.2011.05.011 (2011)**

CLIMATE CHANGE

The cooling effects of haze

A rise in sulphur emissions attributable mainly to new coal-fired power plants in Asia, and China in particular, may have helped to stabilize global temperatures over the past decade. Sulphur aerosols reflect solar radiation back into space.

Robert Kaufmann at Boston University in Massachusetts and his colleagues conducted a statistical analysis of factors that enhanced or offset climate warming between 1998 and 2008, including atmospheric circulation trends and greenhouse-gas levels.

The results suggest that rising sulphur emissions, along with natural climate variability, explain the hiatus in warming.

Proc. Natl Acad. Sci. USA **doi:10.1073/pnas.1102467108 (2011)**

METABOLISM

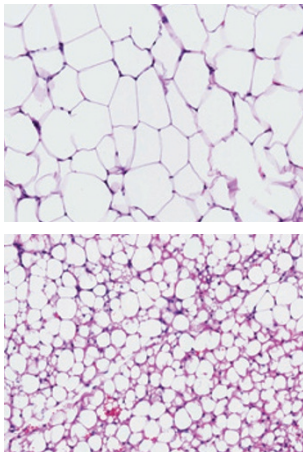
Bad fat makes good

Energy-storing white fat can be converted to energy-burning brown fat by suppressing a cell-signalling pathway.

Sushil Rane at the National Institute of Diabetes and Digestive and Kidney Diseases in Bethesda, Maryland, and his group report that mice lacking the protein SMAD3 are more sensitive to insulin and gain less weight on a high-fat diet than normal mice. The authors found that loss of SMAD3 caused white fat (**pictured top**) to take on certain key features of brown fat (**bottom**), such as the generation of more mitochondria, which power the cell.

SMAD3 is part of the same pathway as the protein TGFβ. Administering TGFβ to normal mice blocked the conversion of white to brown fat, whereas inhibiting TGFβ in mice prone to obesity and type 2 diabetes suppressed both conditions. Furthermore, a survey of 184 non-diabetic humans revealed a correlation between TGFβ levels and body-mass index.

Cell Metab. 14, **67–79 (2011)**



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PLANT BIOLOGY

New light shed on leaf growth

HIGHLY READ on genesdev.cshlp.org 1 July–5 July

The development of new leaves is triggered by light, a finding that contradicts 150 years of conventional thinking. Leaf initiation was thought to be unaffected by environmental cues such as light because the shoot apical meristem — the region at the top of the plant stem responsible for new growth — is sheltered by older leaves.

Cris Kuhlemeier and his team at the University of Bern studied leaf initiation in tomato plants grown in light or darkness. New leaves did not grow on plants kept in the dark, but leaf initiation resumed when plants were transferred to the light. Chemically blocking photosynthesis did not affect leaf production, indicating that light itself is needed.

The researchers propose that light stimulates the cytokinin and auxin signalling pathways; however, it remains unclear how these two hormone systems interact in this process.

Genes Dev. 25, **1439–1450 (2011)**

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