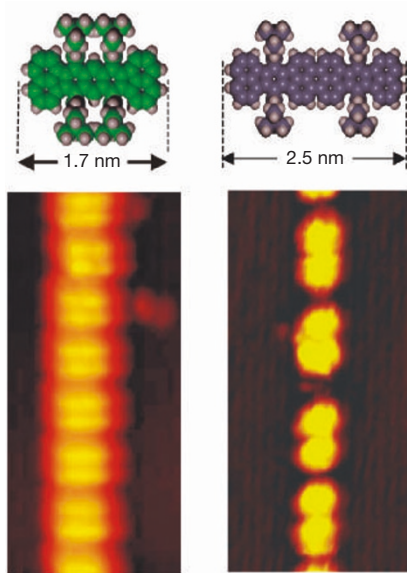


Surface chemistry

The molecules have landed

Angew. Chem. Int. Edn 43, 2092–2095 (2004)

The ‘Lander’ molecules got their name from their resemblance to the Mars Lander craft. They have a conducting ‘board’ and four insulating legs, which act as tiny pylons that support the conducting board and isolate it electrically from the surface below. Roberto Otero and colleagues have found that, on a copper oxide surface patterned with 2-nanometre-wide lines of copper, the length



of a Lander molecule determines whether it will orient across or along the copper lines.

Otero *et al.* report that short ‘single’ Landers (C₉₀H₉₈, above left) arrange themselves perpendicularly to the copper stripes, but longer ‘violet’ Landers (C₁₀₈H₁₀₄, above right) find it energetically more favourable to align along the copper lines. Such spatial and orientational control of these (and probably other) molecules could prove a convenient way to fabricate integrated electronic circuits on the nanoscale. It would allow molecules to be arranged in thermally stable chains without the need for direct manipulations with, for example, a scanning tunnelling microscope.

Rosamund Daw

Neurobiology

Mutation skews eyes

J. Neurophysiol. 91, 2066–2078 (2004)

In people, defects in the cerebellum — a brain region involved in balance and coordination — commonly cause abnormal eye movements. In mice, mutations that alter a voltage-sensitive calcium channel, the P/Q channel, are predicted to interfere with signalling within and between cerebellar

neurons. So might these mutations also interfere with eye movements? John S. Stahl has found that they do, suggesting that the mutant mice may prove useful for studying the role of the cerebellum in controlling eye movement.

Using video recordings, Stahl measured reflex eye movements in so-called *rocker* mice, in which P/Q channels are mutated. He found substantial abnormalities compared with normal mice, such as lower amplitudes of movement and unusual vertical eye positions. Both humans and mice with P/Q mutations suffer age-related cerebellar degeneration, which could itself alter eye movements. But Stahl showed that some of the movement abnormalities are lifelong, and so could result directly from the effects of the inherited mutation on the electrical properties of the P/Q channel.

Laura Nelson

Astronomy

Star survey complete

Astron. Astrophys. doi:10.1051/0004-6361:20035959 (2004)

Basic information about our solar neighbourhood is still surprisingly incomplete, but the Geneva–Copenhagen survey of Sun-like stars in the Milky Way has now added an enormous amount of detail about our galaxy.

B. Nordström *et al.* have catalogued the precise three-dimensional motions, ages, temperatures and compositions of more than 14,000 stars. The research required roughly 63,000 individual velocity observations spread over 15 years, and includes almost all the Sun-like stars within 150 light years of Earth.

The survey reveals that about one third of the stars exist in binary systems, and that current models describing the dynamical heating of disk stars seem unable to match data that relate the ages and velocities of the stars. The team concludes that the history of our galaxy is much more turbulent than previously thought.

This mammoth data set is unlikely to be superseded before the results from the European Space Agency’s GAIA satellite become available in 2015.

Mark Peplow

Cancer

A famine connection

J. Natl Cancer Inst. 96, 539–546 (2004)

Animal studies have hinted that reducing food intake may lower the risk of breast cancer, although different dietary regimes have different effects. But Sjoerd G. Elias *et al.* suggest that short, severe bouts of food deprivation may in fact increase breast-cancer risk.

The authors studied a group of 15,000 Dutch women who were alive during the famine of 1944 to 1945 in the Netherlands.

Fifty-five years after the famine, 585 of these women were diagnosed with breast cancer. Elias *et al.* found that the risk of breast cancer correlated with the severity of famine exposure. Women who experienced the most severe food deprivation had a 48% higher risk of developing the condition than those unaffected by the famine. The association was even stronger for women who were aged between 2 and 9 when the food shortage hit.

The mechanisms that might link severe food deprivation to breast cancer are not known, but the authors suggest that several hormonal systems may be involved. These systems might adapt to famine and then be unable to deal with food abundance in later life.

Helen R. Pilcher

Metabolism

Is size everything?

Funct. Ecol. 18, 184–187 (2004)

Bigger animals need to generate greater metabolic power than their smaller counterparts, but the relationship between size and metabolic performance is not linear. Rather, metabolic rate (*Q*) scales with body size (*M*) as $Q \propto M^b$. Researchers have long argued in favour of a universal value of *b*, but a fresh analysis suggests that there isn’t one.

F. Bokma examined 3,572 individual measurements of metabolic rate and body size in fish, drawn from 217 separate data sets on 113 species, and encompassing temperatures from –1.5 °C to 38 °C. The average value of *b* was 0.715, but different groups showed their own conserved values. Most strikingly, a group of 37 measurements of sea trout (*Salmo trutta trutta*) yielded a statistically robust *b* of 0.86.

This is a far cry from previous pronouncements that *b* should hold steady throughout the animal kingdom. Theorists had suggested a constant *b* of 0.667, as would be expected if metabolism scales with body surface area, or of 0.75, as predicted by the supposedly fractal nature of internal transport systems. The latest analysis hints that current theories may well require an extra layer of complexity.

Michael Hopkin



M. LORENZONI