



THIS ISSUE

ALL RIGHT NOW The theory of special relativity is central to modern physics, so if Einstein's iconic $E = mc^2$ were found to be even slightly incorrect, the World Year of Physics would have ended on a sour note. No need to worry, however. A new direct test of the equation confirms its validity with 55 times more accuracy than the best previous effort. The new test combined very accurate measurements of atomic-mass difference and of γ -ray wavelengths to determine the nuclear binding energy for isotopes of silicon and sulphur. The equation holds to a level of at least 0.00004%. [Brief Communication p. 1096]

THAT'S THE SPIRIT Producers of Mexico's national drink have suffered a series of setbacks in recent years, notably *tristeza y muerte de agave*, the 'wilt and death disease' that hit the blue agave plants that produce sweet liquor which is distilled to produce tequila. Monoculture planting made things worse, so now scientists are working on ways to keep the agave crop diverse and disease-resistant. [News Feature p. 1070]

SOMEBODY HAS TO DO IT Geologists are finding a lucrative and enjoyable sideline by studying *terroir*, the ineffable combination



Seeing red: who needs test tubes? of soil, climate and place that, say French vignerons, makes each grape harvest unique. [News Feature p. 1073]

LET'S GET TOGETHER If systems biology is to make the most of the mountain of data on the living cell accumulated over the past 50 years, something needs to be done about the software. Marvin Cassman and colleagues argue that for results to be useful outside of the lab in which they were generated, standardized formats for annotation and storage are essential. This will require concerted action by both researchers and funding agencies, but time is of the essence. [Commentary p. 1079]

SCENT PACKING Male elephants are famed for annual bouts of heightened sexual activity and aggression, the 'musth', when they release a pungent cocktail of chemicals to advertise their mating status. New work shows that this cocktail is very complex: the correct mixture might well reach the parts others do not reach. [Brief Communication p. 1097]



Dance is a common part of human courtship. Is it just for fun or does it carry a hidden message? This question was tackled in a population — Jamaican — where dance is particularly important. One property that dance might reflect is bodily symmetry, often used in evolutionary studies to measure developmental stability and genetic quality. A study using motion capture cameras to create video images of the dancers reveals a strong link between symmetry and dancing ability. The effect is stronger for men than for women, and women rate dances by symmetrical men relatively more positively than do men. It works both ways: symmetrical men value symmetry in women dancers more highly than less symmetrical men. In Jamaica at least, it seems that dance is a factor in sexual selection and reveals important information about the dancer. [Letter p. 1148] Freeze-frame images on the cover (by William M. Brown) show a symmetrical male dancer in action. 1068 Caps that cheer | 1132 Supreme echoes | 1105, 1151, 1157, 1092 *Aspergillus* genomes | 1187 Naturejobs

Walking with humans

The narrative of human evolution that has held sway for many years, and captured the public imagination along the way, is known as 'Out of Africa 1'. This postulates that the genus *Homo* originated in Africa, and as *H. ergaster* or *H. erectus*, left Africa about 1.8 million years ago. They then colonized Asia and eventually Europe and beyond. But does this conjectural migration from a hypothetical centre of origin still fit the facts? Robin Dennell and Wil Roebroeks think not, and argue that recent fossil finds in Chad and across Asia mean that it's time to construct a new model to fit the sparse but widely spread hominin fossil record. [Review Article p. 1099]

Night and day

Animals and plants have developed an internal biological clock that uses the light/dark cycle of day and night to synchronize daily rhythms in behaviour and physiological function. Is this circadian rhythm simply an adaptation to make good use of light and dark, or is a daily cycle of activity important to the proper function of an organism? The behaviour of



Eight days a week: it's all the same to Arctic reindeer.

reindeer living at high latitudes above the Arctic Circle provides an answer. Here the Sun neither sets in summer nor rises in winter. In these conditions reindeer lose daily rhythmic activity completely. For herbivores in polar regions at least, there is little selective advantage in maintaining circadian organization. [Brief Communication p. 1095]

Genomes with influence

More than 300 labs worldwide are using the fungus *Aspergillus nidulans* as a model system for molecular genetics, and other species of this fungus are important in everyday life. A package of three genomics papers in this issue covers the *Aspergillus* field comprehensively. Galagan *et al.* report the genome sequence of the laboratory classic *A. nidulans*, and Nierman *et al.* have sequenced *A. fumigatus*, known chiefly as a human pathogen and allergen. And finally Machida *et al.* present genome sequencing and analysis of *A. oryzae*, focusing in particular on the expansion of genes in its genome, which is almost 25% bigger than the other two genomes. *A. oryzae* is used in traditional Chinese and Japanese food fermentation (think soy sauce) and also in enzyme production by biotechnologists. [Article p. 1105; Letters pp. 1151, 1157; News and Views p. 1092]

The waters ran shallow

Surface features at the landing site of Opportunity, the Mars Exploration Rover, have been taken as evidence that liquid water was once abundant on Mars. But two groups now present alternative explanations of the

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Mars with grass: earthy parallels for martian waters.

layered structures and mineral compositions of the Meridiani Planum that do not involve a standing body of liquid water. Turbulent flow of rock fragments, salts and ice produced by meteorite impact and deposition of volcanic material followed by reaction with condensed sulphur dioxide- and water-bearing vapours, are offered as alternative explanations for the observations. [Articlep. 1123; Letter p. 1129; News and Views p. 1067]

Catch up with Kepler

We may soon be able to see the slight seen by Tycho and Kepler, but 400 years later. In 1940 Fritz Zwicky, the man who coined the term 'supernova' for massive star explosions, suggested that it should be possible to see echo light from historical supernovae centuries after the event. Data from the SuperMACHO survey, which is monitoring the millions of stars in the Large Magellanic Cloud for the brightening associated with gravitational microlensing, show that Zwicky was spot on. Echoes have now been traced back to three positions where young supernova remnants appear, and ages have been estimated for two of them, at 610 and 410 years. This discovery opens up the prospect of finding echoes from the supernovae in our own Galaxy that were observed by Tycho and Kepler. Light from the echoes can be observed spectroscopically to determine what type of supernova exploded. [Letter p. 1132]

Climate warming in the air

Human activities, chiefly biomass burning and industrial processes, increase the atmospheric loading of tiny particles called aerosols. As the aerosols interact with solar and thermal radiation, they have a significant impact on climate, yet the sum of their radiative effects on the atmosphere remains uncertain. Using state-of-the-art satellite measurements and modelling, the global clear-sky radiative effect of anthropogenic aerosols has been estimated over both land and sea for 2002. The net effect suggests stronger cooling than previously modelled estimates. As atmospheric aerosol levels continue to fall as a result of clean-air policies, future atmospheric warming may be greater than presently predicted. [Letter p. 1138; News and Views p. 1091]

Ready for a walk

Before the first four-legged animal or tetrapod took to the land about 364 million years ago its fish ancestors needed to acquire many things, including legs and their supporting elements, the girdles. *Panderichthys* is the closest fossil fish relative of tetrapods and its pectoral fins (would-be front legs) and shoulder girdle are transitional between fishes and tetrapods. Its pelvic fins (hind legs) are very important in understanding how fish climbed out of water and now for the first time a fossil with pelvic fin and supporting pelvis has been found. They show that *Panderichthys* could have moved on land by anchoring its fins on the ground and dragging itself along in a manner similar to that of the modern walking catfish. [Letter p. 1145]

Glial glutamate receptors

Oligodendrocytes are the cells in the white matter of the central nervous system that produce and maintain the myelin sheath that insulates the impulse-carrying axon. They are damaged by the neurotransmitter glutamate in diseases as diverse as cerebral palsy, spinal cord injury, stroke and multiple sclerosis. It has become widely accepted that, unlike neurons which are mainly killed by glutamate acting on NMDA receptors, oligodendrocytes lack these receptors and are killed solely by glutamate acting on AMPA/kainate receptors. This thinking has guided therapeutic strategies, but it seems that the underlying assumption about glutamate receptor types may be wrong. Three papers published this week make a convincing case for the presence of NMDA receptors in oligodendrocytes, and for their involvement in causing damage to the cells in injury and disease. This will refocus attention on NMDA receptors as an important therapeutic target for drugs in a variety of neurological disorders. [Letters pp. 1162, 1167; doi: 10.1038/nature04474]

Plant growth controls

In plants the apical meristem at the tip of each shoot contains a population of stem cells ready to proliferate and direct plant growth when they receive the command. Comparative microarray experiments in *Arabidopsis* plants carrying inducible mutations of meristem regulators now show how plant hormones such as cytokinins can communicate with the meristem via a network of transcriptional activators and repressors. The homeobox protein WUSCHEL, known to control stem cell fate, has been found to act directly on a series of signalling proteins previously shown to participate in cytokinin signalling, thus providing a negative feedback loop for maintaining the size of the apical meristem. [Letter p. 1172]

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