

# RESEARCH HIGHLIGHTS

## Old Faithful Erebus

*J. Volcanol. Geotherm. Res.* **177**, 589–605 (2008)  
Sited on the Terror rift of the Western Ross Sea, Antarctica, Mount Erebus is the continent's most active volcano and has a rare convecting magma lake at its summit. Peter Kelly of the New Mexico Institute of Mining and Technology in Socorro and his colleagues investigated the composition of this lake using lava bombs it spewed forth from 1972 to 2004.

Analysis of the glass and mineral composition of these bombs indicates that the temperature of the magma has been stable during this period, contradicting a previous suggestion of a cooling. Another analysis of 11 dated lava samples from the summit plateau ranging back to 17,000 years ago shows that the volcano has erupted lava with the same bulk composition for all this time.



G. STEINMETZ/CORBIS

## CHEMICAL BIOLOGY

### Fluorescent timers

*Nature Chem. Biol.* doi:10.1038/nchembio.138 (2009)  
New fluorescent 'timers' that gradually change colour from blue to red could allow researchers to track the age and dynamic behaviour of proteins in living cells.

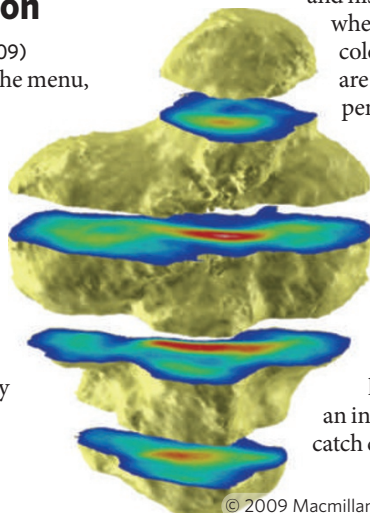
Previous work suggested that some red fluorescent proteins start out fluorescing blue, but then change to red as the protein is chemically modified over time. Vladislav Verkhusha and his colleagues at the Albert Einstein College of Medicine in New York mutated a red fluorescent protein called mCherry, then screened for mutants that had altered maturation rates from blue to red.

The researchers developed three fluorescent proteins, each with a specific maturation rate. The proteins were used to track newly synthesized proteins in mammalian cells grown in culture.

## MICROSCOPY

### Inside information

*Phys. Rev. Lett.* **102**, 018101 (2009)  
Sliced chromosome is on the menu, thanks to a tour-de-force of X-ray microscopy. Yoshinori Nishino of the RIKEN SPring-8 Center in Hyogo, Japan, and his co-workers have recorded three-dimensional sectional images of a human chromosome (pictured right) using coherent X-ray diffraction microscopy. Chromosomes are too



dense for electron microscopes to see 'inside' them, and fluorescent light microscopy can reveal only selected features. By contrast, the X-ray diffraction method offers a full three-dimensional view of electron density in a single chromosome about 2 micrometres across, showing the internal structure with a resolution of about 120 nanometres.

## ANIMAL BEHAVIOUR

### Caught red hydrocarboned

*Curr. Biol.* **19**, 78–81 (2009)

Ants, like other social creatures, strive to minimize antisocial behaviour by punishing cheaters. For example, fertile worker *Aphaenogaster cockerelli* ants that could undermine the unity of a colony with a single reproducing queen are attacked by nestmates. Although it has remained unclear how would-be cheaters are identified, evidence suggested that variations in the hydrocarbons in ants' cuticles might be involved. Jürgen Liebig of Arizona State University in Tempe and his colleagues show that

when *A. cockerelli* workers in colonies headed up by a queen are manually coated with pentacosane, a hydrocarbon linked with fertility, they are attacked by their nestmates.

Because ant eggs carry distinctive related hydrocarbons that prevent them from being identified and destroyed, cheaters probably cannot suppress their chemical profiles. Thus, hydrocarbons could provide an inherently reliable method to catch cheaters.

## MOLECULAR BIOLOGY

### A bilingual genetic code

*Science* **323**, 259–261 (2009)

A ciliate called *Euplotes crassus* seems to have violated the rules of genetics.

Messenger RNA is used as a template to assemble proteins by means of three-letter sequences called codons. Each codon corresponds to either a single amino acid or a 'stop' signal. However, Vadim Gladyshev of the University of Nebraska in Lincoln and his colleagues found that in *E. crassus*, the codon UGA could encode two amino acids: cysteine or selenocysteine.

The codon could be read in both ways within the same gene, depending on its location within the mRNA strand and the presence and exposure of a specific sequence near the end of the mRNA molecule. The results suggest that the genetic code can be evolutionarily expanded.

## ECOLOGICAL ACOUSTICS

### Love buzz

*Science* doi:10.1126/science.1166541 (2009)

The buzz of flying female mosquitoes acts as a mating signal to attract males. When Ronald Hoy and his team at Cornell University in Ithaca, New York, listened closer, they found that when both sexes of *Aedes aegypti* get together, they change their buzz pitch to match, producing a courtship duet. But rather than duo at their usual wing beat frequencies — of around 400 hertz for females and 600 hertz in males — the mosquitoes take their acoustics up a notch to a shared harmonic frequency of 1,200 hertz.

Male mosquitoes were previously thought to be deaf to frequencies above 800 hertz.