RESEARCH HIGHLIGHTS

BIONANOSENSING

Picky chips

Angew. Chemie Int. Edn doi:10.1002/anie.200902577 (2009)

MicroRNA molecules — key regulators of many cellular and disease processes — can be quickly measured even at low levels using a chip-based detector developed by Shana Kelley of the University of Toronto, Canada, and her colleagues.

The silicon microchip has tiny palladium electrodes coated with synthetic peptide nucleic acids, which bind to specific microRNA (miRNA) molecules. To generate a signal, the researchers incorporated a ruthenium-based reporting system into the chip. When a certain level of miRNA is bound at the electrodes, ruthenium ions are electrochemically reduced, giving off an electrical signal.

The chip was able to detect 100 molecules per microlitre of a specific miRNA in about 30 minutes. It also indicated much higher levels of cancer-associated miRNAs in human head and neck cancer cell extracts than in normal cell extracts.

ATMOSPHERIC SCIENCE

Fire down under

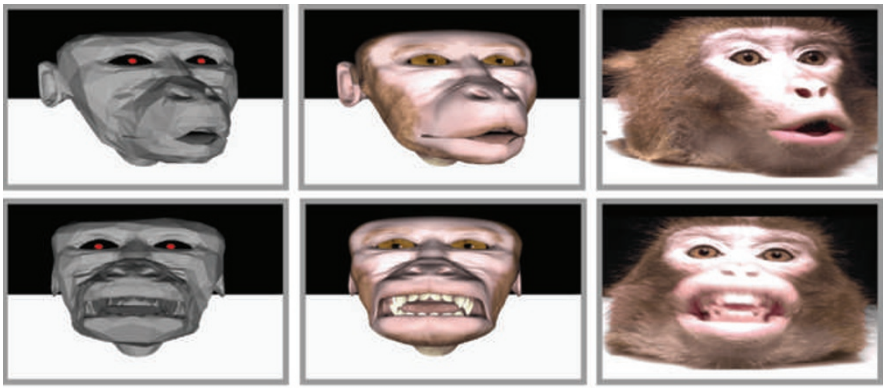
Geophys. Res. Lett. doi:10.1029/2009GL039902 (2009)

The cause of the bush fires that swept across southeastern Australia in February, killing more than 170 people, can be traced back to shifting ocean patterns.

Researchers know that when sea-surface temperatures are cooler than normal in the eastern Indian Ocean, and warmer than usual in the western Indian Ocean, this can result in severe drought in southeastern Australia. Now Wenju Cai of CSIRO in Aspendale, Australia, and his colleagues have linked this ocean anomaly to a heightened risk of fire.

Using data on soil moisture and weather patterns, the researchers found that the Indian Ocean shift preceded 11 of the 21 significant bush fire seasons in Australia since 1950 — including February's fires. These ocean changes have been increasing in number — as might be expected owing to global warming — leading the team to suggest that severe fires could occur more frequently if temperatures continue to rise.

AP PHOTO



S. STECKENFINGER

Unrealistic Realistic Real

Dislikeable likeness

Proc. Natl Acad. Sci. USA doi:10.1073/pnas.0910063106 (2009)

As robots and computer-generated avatars grow more like humans in appearance, real humans become more accepting of them, although only to a point. When non-human figures start looking too much like humans, people react negatively — an effect called the 'uncanny valley'.

Now Shawn Steckenfinger and Asif Ghazanfar of Princeton University in New Jersey have shown that the uncanny valley is not unique to humans. They presented five macaques (*Macaca fascicularis*) with video footage and static images of real monkey faces along with realistic and unrealistic synthetic faces (pictured). The macaques preferentially looked at the real faces and unrealistic synthetic ones, shunning the realistic synthetic ones.

As the effect is apparently not dependent on human culture or brain structures, an evolutionary root for this is plausible, the researchers say.

BIOCHEMISTRY

Hungry circadian clock

Science **326,** 437–440 (2009)

Natural rhythms in mammalian physiology and behaviour are set in the brain by the daily light–dark cycle. But in some organs, the circadian clock can be set by nutrient availability — possibly allowing optimal timing of metabolic processes.

Ronald Evans at the Salk Institute for Biological Studies in La Jolla, California, Craig Thompson at the University of Pennsylvania in Philadelphia and their colleagues have identified how nutrient levels influence these light-independent clocks. They found that, in mouse livers, expression of one component of the enzyme AMPK, a nutrient-sensitive metabolic regulator, is cyclical. In addition, AMPK initiates the destruction of cryptochrome 1, a key part of the circadian clock.

Mice in which AMPK signalling was disrupted had altered circadian rhythms.

PHYSICS

Stars in a pellet

Nature Phys. doi:10.1038/nphys1402 (2009)

A team of researchers has used a high-power laser, a tiny hollow plastic pellet and silicon foil to reproduce the X-rays emitted by stars. Shinsuke Fujioka of Osaka University in Japan and his colleagues fired 12 green laser beams at the pellet, compressing and heating it. As the plastic became superheated, silicon atoms near the pellet were ionized, releasing X-rays resembling those seen in two distant binary star systems, where one star is orbiting another.

The authors believe the study could help to refine models for such astronomical systems, and that the radiation from the superheated pellets might recreate the conditions thought to exist at the edge of a black hole.

CELL BIOLOGY

Golgi stretch

Cell **139,** 337–351 (2009)

The Golgi body — a key organelle that processes proteins and lipids for secretion from the cell — is a pile of flattened membranes. Researchers have identified two proteins that work together to maintain the Golgi's shape and function.