# RESEARCH HIGHLIGHTS

## Dynamics of a dance

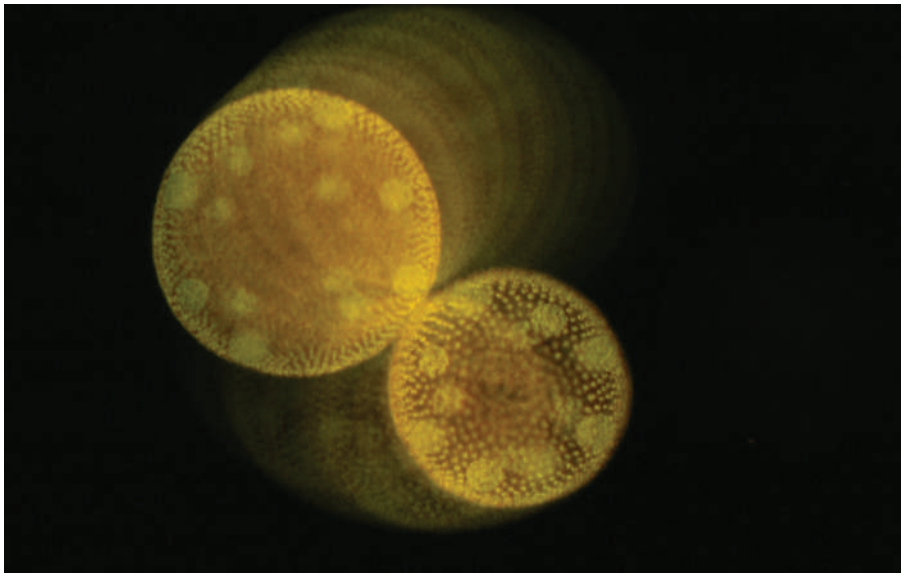
*Phys. Rev. Lett.* **102,** 168101 (2009)

*Volvox* are microscopic algae, spherical aggregates of thousands of flagellated cells. The spheres twirl about in ponds, swimming up and down in the water and interacting with their neighbours in seemingly orchestrated dances.

Physicist Raymond Goldstein of the University of Cambridge, UK, and his colleagues investigated the fluid dynamics used by *Volvox carteri* contained in a microscope-equipped chamber. Near the top of the chamber they observed the tiny dancers 'waltzing', spinning about each other in a clockwise fashion. Near the bottom, the spheres participated in a more complex 'minuet'.

The authors suggest that the careful dances increase female encounters with sperm packets during sexual reproduction.

**For movies, see http://tinyurl.com/degwdj.**



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CHEMISTRY

## Fuel from thin air

*Angew. Chem. Int. Edn* **48,** 3322–3325 (2009)

Carbon dioxide can be sucked out of the air (see News Feature, page 1094) and turned into a useful fuel using a metal-free catalyst.

The carbene catalyst — a compound with a pair of electrons available to react — is not only metal-free, and so better for the environment, it also works in air. Metal catalysts are often degraded by oxygen.

The system, which also uses a silicon-containing molecule, a silane, to activate carbon dioxide and drive the reaction, was developed by Jackie Ying, Yugen Zhang and Siti Nurhanna Riduan at the Institute of Bioengineering and Nanotechnology in Singapore.

The reaction product, methanol, can be turned into other carbon-based fuels, or used itself as a biofuel.

BIOCHEMISTRY

## DNA base maker

*Science* doi:10.1126/science.1170116 (2009); *Science* doi:10.1126/science.1169786 (2009)

Although four DNA bases — adenine, thymine, cytosine and guanine — make up much of the genome, modified bases can serve special purposes. Trypanosomes, parasitic protozoa, contain an additional base called J that is a hypermodified version of thymine that has not been documented in other organisms.

Anjana Rao of Harvard Medical School and her colleagues searched for enzymes similar to those responsible for making base J that might make a similar base in mammals. They found TET1, which makes a modification to cytosine to create hydroxymethylcytosine. This accounts for 4–6% of all cytosines in the DNA of mouse embryonic stem cells.

Meanwhile, independently, Skirmantas Kriaucionis and Nathaniel Heintz at the Rockefeller University in New York have identified the modified base in the mouse brain.

STEM-CELL BIOLOGY

## New stem-cell formula

*Cell Stem Cell* doi:10.1016/j.stem.2009.04.005 (2009)

Ever since Kyoto University's Shinya Yamanaka showed that cultured skin cells could be made to behave like embryonic stem cells by the addition of a handful of genes, researchers have been trying to repeat the trick without introducing DNA to the cells. Now, Sheng Ding at the Scripps Research Institute in La Jolla, California, and his colleagues say they can reprogram cells — in this case mouse embryonic fibroblasts — with those genes' protein products, specifically engineered to cross the cellular and nuclear membranes.

The resulting cells are "morphologically indistinguishable" from embryonic stem cells, the authors say, and express similar markers.

Although such work has not yet been reported in human cells, Ding predicts that similar techniques will replace those requiring DNA or viruses, which are deemed risky in therapeutic applications.

**For a longer story on this research, see http://tinyurl.com/cgonae.**

PHOTONICS

## E-ink goes colour

*Nature Photon.* doi:10.1038/nphoton.2009.68 (2009)

Electronic readers without backlit screens can't beat the contrast and brightness of traditional ink and paper when it comes to colour.

Jason Heikenfeld of the University of Cincinnati, Ohio, and his colleagues, working with the Sun Chemical Corporation, also in Cincinnati, say that they have found a way to improve colour displays. Using inexpensive photolithographic techniques, the researchers made pixels with a reflective background and small wells containing water-dispersed pigments. Apply a voltage and pigment flows out of the well, coating the pixel (pictured left). Surface tension sucks the pigment back when voltage is removed; the switching is fast enough for video displays.

The researchers say their technique offers brightness, matt appearance and contrast that is superior to a related method that uses electric current to flip coloured oil droplets from beads to thin films across a pixel.