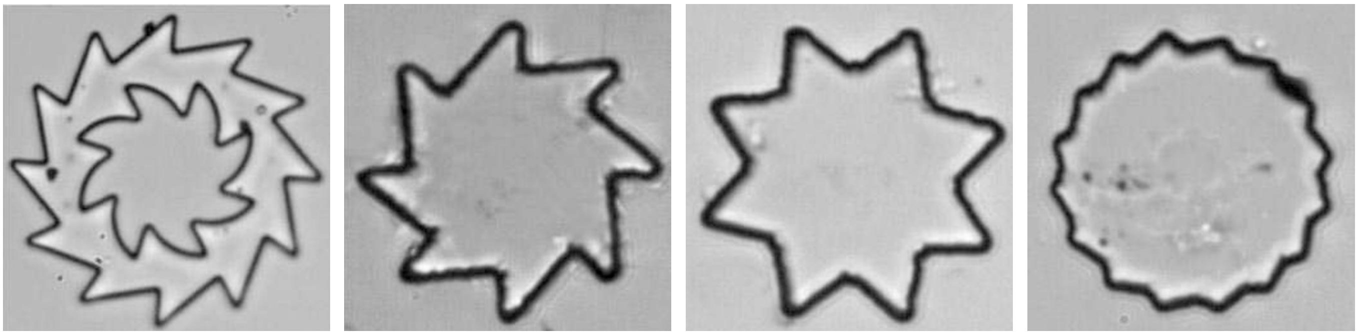
RESEARCH HIGHLIGHTS



R. DI LEONARDO *ET AL.*

Bacterial power

Proc. Natl Acad. Sci. USA doi:10.1073/pnas.0910426107 (2010)

Nanotechnology is still far from producing anything as efficient and compact as self-propelling bacteria. But Roberto Di Leonardo at the National Research Council in Rome and his colleagues have managed to harness *Escherichia coli* to power a small ratchet motor.

They made a variety of symmetrical and asymmetrical glass-based gears (pictured), 48 or 80 micrometres wide. The shape of the asymmetrical gears means that bacteria swimming into them either slide off the end of a cog tooth or become stuck in a corner. Bacteria that stick exert a force that drives the gear around until they free themselves.

When the researchers placed their cogs in a liquid bacterial suspension, they observed about one rotation per minute for the asymmetrical gears, showing that geometry can be used to convert chaotic bacterial motion into predictable movement. **D.P.C.**

NEUROSCIENCE

Instant learning

Neuron **66,** 438–448 (2010)

Many species can learn a new rule by trial and error. But is such learning a gradual process, or does it come all at once in a 'eureka!' moment?

Daniel Durstewitz at the University of Heidelberg in Germany, Jeremy Seamans at the University of British Columbia in Vancouver, Canada, and their colleagues planted electrodes in a brain region called the prefrontal cortex in male rats. They then observed patterns of neural activity while the rats learned a new rule to obtain a food reward.

In many cases, an abrupt shift in neuronal activity corresponded with a change in the strategy an animal used. Such neural and behavioural transition points may correspond to moments of 'sudden insight', the authors suggest. **L.O.-S.**

ORGANIC CHEMISTRY

Biofuel boost

Angew. Chem. Int. Edn doi:10.1002/anie.201000655 (2010)

Woody plants could become a viable feedstock for biofuels, thanks to research at oil-giant Shell.

Jean-Paul Lange at the Shell Technology Centre Amsterdam and his colleagues have developed a technique to convert lignocellulose — a component of plant cell walls that is hard to break down — into levulinic acid, and from that to valeric acid. This can then be used to make esters that can be burned as fuel.

The team devised a method to produce the valeric acid and refined known procedures for the other steps. The authors say that valeric biofuels, owing to their chemical properties, may perform better than other candidate biofuels. A blend of the valeric fuels with regular petrol or diesel did not cause any discernable engine damage in ten vehicles tested. **K.S.**

CANCER

Melanoma's moving target

Cell **141,** 583–594 (2010)

In many cancers, tumour growth has been attributed to a small, fixed subset of cells known as cancer stem cells. But melanomas are thought to follow a different path. Researchers now report that a dynamic group of melanoma cells is responsible for continuous tumour growth, with individual cells in this group transiently acquiring and losing this ability to drive tumour growth.

Meenhard Herlyn at the Wistar Institute in Philadelphia, Pennsylvania, and his colleagues found that the enzyme JARID1B, which is involved in cancer and in normal stem-cell biology, is a marker for this subpopulation of melanoma cells. Silencing the *JARID1B* gene in human melanoma cells *in vitro* resulted in an initial increase in cell proliferation, which then levelled off. When transplanted into mice, the JARID1B-knockdown cancer cells eventually stopped dividing. They also resulted in the formation of fewer secondary lung tumours.

Cells positive or negative for the enzyme each gave rise to a mixed population of these two cell types. **C.L.**

ECOLOGY

No farm is an island

Ecol. Lett. doi:10.1111/j.1461-0248.2010.01481.x (2010)

It seems intuitive that organic farming should be good for biodiversity, but studies at the single-farm scale have had mixed results. This is probably because many species need more space than one field or farm provides to support their life cycle.

Doreen Gabriel at the University of Leeds, UK, and her colleagues decided to expand the analysis area. They compared biodiversity levels in 100-square-kilometre areas of British farmland that contained either high or low amounts of organic cultivation.

The researchers sampled thousands of organisms — including plants, birds, insects and worms — in the farms' fields and along their edges (pictured), and found that the farming practices of both a given farm and its neighbours affect biodiversity. A conventional farm in an organic hotspot is likely to be as biodiverse as an organic farm surrounded by conventional ones. **E.M.**

M. TASKER