

NANOTECHNOLOGY

Swirls move tiny objects

Individual cells can be manipulated by tiny vortices generated in fluids, rather than by the potentially harmful lasers or electric fields typically used. The concept is the brainchild of Li Zhang and his colleagues at the Swiss Federal Institute of Technology in Zurich, who used the vortices to control the movement of microscopic objects.

The team placed a tank of water in a rotating magnetic field, which triggered nickel nanowires in the tank to rotate in turn, generating microvortices. The vortices trapped polystyrene microbeads in the water. By controlling the movement of the nanowires, the authors could tightly control the movement of the beads.

They also successfully manipulated *Escherichia coli* bacteria using a pair of microspheres in place of the nanowires.

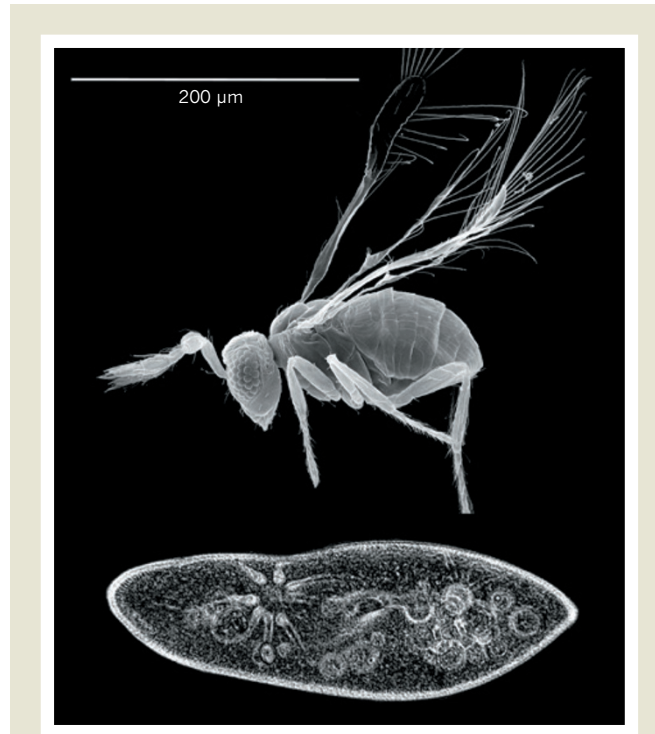
Nano Lett. <http://dx.doi.org/10.1021/nl2032487> (2011)

ANIMAL BEHAVIOUR

Rats rescue others in distress

Primates show signs of empathy, but can other mammals sense and respond to emotional distress in another individual? Yes, say Peggy Mason and her co-workers at the University of Chicago in Illinois, who report that rats will liberate a trapped individual even when they do not receive a reward for doing so.

In the experiments, one rat was trapped inside a container within a larger arena in which another rat roamed free. By day



NEURODEVELOPMENT

Wasp neurons lack nuclei

A tiny parasitic wasp that is smaller than some single-cell organisms (such as *Paramecium*, pictured bottom) has the fewest neurons of any insect studied so far. The bulk of the cells even lose their nuclei when the insects become adults.

Alexey Polilov of Lomonosov Moscow State University sectioned pupae and adults of the wasp (*Megaphragma mymaripenne*, pictured top) and examined their central nervous systems with light and electron microscopy. The wasp's brain contained around 4,600 neurons — orders of magnitude fewer than house flies (340,000 neurons), bees (850,000) or even closely related parasitic wasps (37,000).

During metamorphosis to an adult, more than 95% of *M. mymaripenne*'s neurons lost their nuclei and cell bodies — the bulbous part of the neuron that contains the nucleus. As a result, the creature's brain shrank by almost 50%. The neurons seem to function without nuclei, because the wasps were still able to fly, eat and find hosts for eggs.

Arthropod Struct. Dev. 41, 29–34 (2012)

six or seven, on average, the roaming rat learned to free the trapped one. When a container holding chocolate was added to the arena, the liberators took roughly the same amount of time to free a trapped rat as

to access the treat.

Distressed rats typically freeze in response to another distressed rat. The fact that the creatures can control such urges to help another shows that empathy can motivate

behaviour in animals other than primates, the authors suggest.

Science 334, 1427–1430 (2011)
For a longer story on this research, see go.nature.com/87bk8y

CLIMATE CHANGE

The growth of dying seas

Oxygen-deprived dead zones in coastal waters around the world have expanded exponentially since the 1960s and are likely to increase further in a warming climate.

Markus Meier of the Swedish Meteorological and Hydrological Institute in Norrköping and his colleagues used a group of physical–biogeochemical models, driven by data from regional climate models, to project the effects of climate change and changes in nutrient cycles on oxygen conditions in the Baltic Sea.

Most scenarios suggested that oxygen-depleted zones at the bottom of the sea would expand by the end of the century. Driving factors include rising nutrient input from river runoff; reduced oxygen flux from the atmosphere to the ocean; and increased oxygen consumption by surface-level organisms that are fed by the boost in nutrients. Similar changes can be expected for coastal oceans worldwide, the authors say.

Geophys. Res. Lett. <http://dx.doi.org/10.1029/2011GL049929> (2011)

ASTRONOMY

A filter for the night sky

Infrared signals from distant stars that formed soon after the Universe itself could one day be discerned from Earth, thanks to a specially