

Compiled by Steve Reucroft and John Swain, Northeastern University

Shrimps tell left from right in light

Linearly polarized light is common in nature and appears more or less any time that light is reflected. However, circularly polarized light is certainly more exotic, so it has come as something of a surprise to biologists to find the first animal that seems to be sensitive to this particular form of polarization.

Tsyr-Huei Chiou from the University of Maryland, and colleagues from the University of Queensland, Brisbane, and the University of California, Berkeley, have shown that a species of Indonesian mantis shrimp, *Odontodactylus cultrifer*, seems to recognize in which direction light is circularly polarized. This is a fourth way in which animals are sensitive to light, in addition to intensity, colour and linear polarization.

In addition to having a fin where the degree of redness varies depending on whether it is looked at through a right- or left-polarizing filter, these little creatures can actually be trained to recognize which of several tubes contains food, by sensing the circularly polarized light that the food container reflects. After a period of training where the food was in a tube lit by either left- or right-circularly polarized light, the subjects would continue to choose the correct tube even when no food was present.

Why these shrimps developed this strange ability is not known, but it could provide for a



The peacock mantis shrimp (*O. scyllarus*), a close relative of *Odontodactylus cultrifer*, whose similar looking eyes can distinguish light that is circularly polarized in different directions. (Courtesy Michael James/Dreamstime.com.)

very private and low-noise communications channel to help find mates. It could also have evolved to deal with the murky environments that the shrimps have inhabited during the 400 million years since crustaceans of this kind first appeared on Earth.

Further reading

C Tsyr-Huei et al. 2008 *Current Biology* **18** 429.

Atomic neutrality

Are neutral atoms really neutral? A new experiment could look for tiny charges as low as $10^{-28}e$, beating present limits by eight orders of magnitude, according to Asimina Arvanitaki and colleagues at Stanford University. The idea is to use lasers to split a beam of cold rubidium atoms into a superposition of two momentum states and then see how they interact with electric fields that could slightly slow down one component with respect to the other if a charge were present. A phase shift could give away the presence of a tiny charge. The effect sounds bizarre, but it is actually anticipated by some theorists.

Further reading

A Arvanitaki et al. 2008 *Phys. Rev. Lett.* **100** 120407.

Radioprotective drug leaves tumours sensitive

Lyudmila Burdelya of the Roswell Park Cancer Institute in Buffalo, New York, and colleagues have found a drug that protects normal cells from radiation while leaving cancer cells vulnerable. The compound, derived from salmonella, can protect mice and monkeys from radiation if administered before exposure to otherwise lethal doses of radiation, without making tumours less susceptible. It could prove useful both in case of accidental exposures to radiation, and as an adjunct to cancer radiotherapy.

Further reading

LG Burdelya et al. 2008 *Science* **320** 226.

A shocking sense of smell

Small electric shocks can be used to train humans to learn the difference between two mirror-image versions of a molecule. This work by Wen Li and colleagues at Northwestern University in Chicago and Evanston might seem rather uninteresting were it not that the two versions of the molecule in question apparently smell the same. While scents are known to smell differently depending on the chirality of the molecule involved, this new evidence indicates a human sense of smell that is more subtle than realized.

Further reading

W Li et al. 2008 *Science* **319** 1842.

RF really does make saltwater burn



A solution of 3% sodium chloride burns in a Pyrex test tube (left) and a PTFE tube (right) when ignited in the presence of 13.56 MHz RF radiation (Roy, Rao and Kanzius 2008).

In the wake of a spate of media-hype and YouTube videos showing salt water apparently burning, Rustum Roy and ML Rao of Pennsylvania State University have made a detailed study of the effect with its discoverer John Kanzius. While some details of the mechanism remain unclear, the basic idea is that intense radio waves at 13.56 MHz can dissociate water into hydrogen and oxygen which can be ignited to burn with a steady flame.

While not the free-energy-from-water source that some people wish would exist, this novel RF-driven and chemically active plasma could have interesting industrial and research applications.

Further reading

R Roy, ML Rao and J Kanzius 2008 *Materials Research Innovations* **12** 3.