

RESEARCH HIGHLIGHTS

Selections from the
scientific literature

ANIMAL BEHAVIOUR

How termites drum up help

To call for assistance when their nest is under attack, some termites use their heads.

Wolfgang Kirchner and Felix Hager of Ruhr University in Bochum, Germany, mimicked predator attacks on two species of African termites that grow fungi in long underground galleries connected to their nests. Specialized soldier termites responded by drumming their heads against the ground, which drew more soldiers to the alarm. Laboratory experiments confirmed that soldiers sense the low-frequency vibrations.

Vibrations from simulated drumming dissipated within 40 centimetres, but many galleries are much longer. To transmit alarm calls over greater distances, the termites pass signals on to others until the messages reach soldiers, the researchers suggest.

J. Exp. Biol. 216, 3249–3256 (2013)

ECOLOGY

Soil life predicts nutrient flow

Studies of soil organisms are usually lab-based, but in a rare field study, Franciska de Vries — now at Lancaster University, UK — and her colleagues looked at the relationship between soil food webs and carbon and nitrogen entering and leaving controlled areas. The 60 sites — in Sweden, the United Kingdom, the Czech Republic and Greece — included grassland, intensely farmed sites and areas with crop rotation.

Intensive land use, such as wheat cultivation, reduced the mass of soil life of all kinds.



JULIE DERMANSKY/CORBIS

CLIMATE SCIENCES

Global heat waves on the rise

Heat waves will become more common by 2040. Climate models used by Dim Coumou of the Potsdam Institute for Climate Impact Research in Germany and Alexander Robinson at the Complutense University of Madrid predict that about 20% of Earth's land surface will experience monthly temperatures that are more than three standard deviations from the mean. Such extremes occur over about 5% of the global land surface today, and were seen in

the 2012 heat wave across the United States and in the Texan heat wave of 2011, when reservoirs nearly dried up (pictured).

The heat-wave projections stand until 2040, no matter how much more carbon dioxide humans put into the air. After that, lowered emissions could allow temperatures to stabilize, whereas maintaining current emissions would see the frequency of heat waves continue to rise. *Environ. Res. Lett.* 8, 034018 (2013)

But the researchers found that biomass within soil was a better predictor of nutrient cycling and soil health than was land usage, and suggest that nutrient models should pay more attention to what happens underground.

Proc. Natl Acad. Sci. USA
<http://dx.doi.org/10.1073/pnas.1305198110> (2013)

CANCER IMAGING

Chemical reaction reveals tumours

A chemical-imaging technique may one day allow tracking of prostate cancer without the

need for invasive biopsies.

A team led by Sarah Nelson at the University of California, San Francisco, exploited differences in how healthy and cancer cells break down certain chemicals, using them to spot tumours in 31 human patients.

The researchers used magnetic resonance imaging to observe isotopically labelled pyruvate, a compound that supplies energy to cells. Shortly after injecting the labelled pyruvate into patients, researchers could observe it being converted into lactate in prostate tumours, and the conversion sometimes revealed cancer in regions that had been

overlooked by conventional imaging. Signals that were more intense indicated faster metabolism of pyruvate, a property that has been linked in animal studies to more-aggressive forms of cancer. *Sci. Transl. Med.* 5, 198ra108 (2013)

MATERIALS

Catalyst forms under pressure

High pressure normally turns the porous minerals known as zeolites into a powdery, non-crystalline mess. Chemists have now shown that this is not