

RESEARCH HIGHLIGHTS

Selections from the scientific literature

PLANT NANOTECHNOLOGY

Bionic plant can sense explosives

By incorporating fluorescent carbon nanotubes into spinach plants, researchers have turned the plants into environmental sensors.

Michael Strano and his colleagues at the Massachusetts Institute of Technology in Cambridge coated carbon nanotubes with a peptide that binds to nitroaromatic compounds, which include explosives. They embedded the nanoparticles into the leaves of spinach plants. When chemical contaminants are absorbed by the roots or leaves, they attach to the nanotubes, causing the nanotubes' fluorescence to decrease by an amount that depends on the level of the compound. A small detector picks up the signal and relays it wirelessly to a smartphone.

Living-plant sensors could be deployed to large, remote areas for chemical monitoring, the authors say.

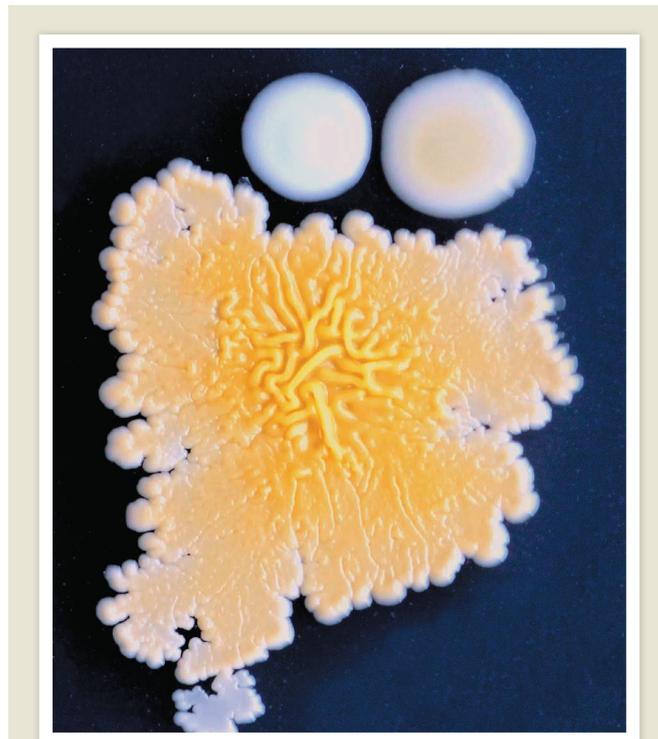
Nature Mater. <http://dx.doi.org/10.1038/nmat4771> (2016)

METABOLISM

Low oxygen resets the body clock

Cutting ambient oxygen levels helps mice to recover from a situation similar to jet lag.

In mammals, circadian clocks synchronize metabolism according to the day–night cycle. Gad Asher at the Weizmann Institute of Science in Rehovot, Israel, and his colleagues found that the amount of oxygen in the blood and kidneys of rodents varies with the time of day. Tests in cultured mouse cells showed that rhythmic fluctuations in oxygen levels synchronized



MICROBIOLOGY

Fungi boost bacterium

A study of 25 cheeses finds that a slow-growing bacterium can outcompete its relatives with the help of fungi.

Benjamin Wolfe at Tufts University in Medford, Massachusetts, and his colleagues examined the relative abundance of *Staphylococcus* bacteria (three species pictured), which are common in cheese. They found that *Staphylococcus equorum* dominated, despite being the slowest grower in lab tests. In the presence of fungi of the genus *Scopulariopsis*, *S. equorum* lowered its expression of genes involved in iron uptake and metabolism. The fungi could be providing the bacterium with freely available iron needed for growth, saving *S. equorum* the effort of acquiring and processing the nutrient, and allowing it to outcompete other bacteria.

Fungi could be influencing the diversity of other bacterial communities, including those in humans, the authors say. *mBio* 7, e01157-16 (2016)

the circadian clock; this seemed to happen through HIF1 α , a protein known to be an oxygen sensor. Mice exposed to a cycle of light and dark that was shifted by six hours to mimic jet lag adapted faster to the new conditions

when ambient oxygen levels were decreased either before or after the shift.

Modulation of oxygen levels could be a future therapy for jet lag, say the authors. *Cell Metab.* <http://doi.org/bsc9> (2016)

ASTRONOMY

Small stars host water worlds

Earth-sized planets covered in water may be abundant around red dwarfs, the most common type of star in the Universe.

Yann Alibert and Willy Benz at the University of Bern used computer simulations to predict the properties of planets that could form around red dwarfs and host liquid water. They found that the radius of the planets would be 0.5–1.5 times that of Earth, with most being around the same size as Earth. More than 90% of the simulated planets were at least 10% water by mass, suggesting that they were completely surrounded by deep oceans.

The authors say that the prospects for life on such planets are unclear, because too much water could destabilize the climate.

Astron. Astrophys. in the press; Preprint at <https://arxiv.org/abs/1610.03460> (2016)

IMMUNOLOGY

Weary T cells may not recover

Exhausted immune cells bear distinct genetic signatures, and may be difficult to revive — a finding with implications for therapies that harness the cells.

Immune cells called T cells can become 'exhausted' and dysfunctional after exposure to cancer or chronic infection. Two teams — one led by John Wherry at the University of Pennsylvania in Philadelphia, the other by Nir Yosef at the University of California, Berkeley, and Nicholas Haining at the Dana-Farber Cancer Institute in Boston, Massachusetts — looked at