

BIOTECHNOLOGY

Yeast turned into opioid-makers

Baker's yeast can be made to produce morphine, codeine and other pain medicines at high levels.

Opioid production is subject to the vagaries of the opium poppy supply chain, so Christina Smolke and her colleagues at Stanford University in California wanted to find alternative ways of making the drugs. They engineered the yeast (*Saccharomyces cerevisiae*) to express genes from the poppy (*Papaver somniferum*) and the bacterium *Pseudomonas putida* M10, then cultured it with thebaine, an opioid intermediary molecule extracted from the poppy. The yeast synthesized high enough levels of several natural and semisynthetic opioids to make the method potentially useful to the pharmaceutical industry, the authors say.

The next step, they add, is to engineer yeast to make these painkillers from simple sugars, eliminating the need for poppies altogether.

Nature Chem. Biol. <http://dx.doi.org/10.1038/nchembio.1613> (2014)

ASTRONOMY

Collision history written in rock

Meteorites recovered in California have yielded details about their collision-filled journey from the Solar System's asteroid belt.

The fragments (pictured) originated from a meteoroid whose fiery descent lit up the night sky over San Francisco in 2012. Peter



Jenniskens of NASA's Ames Research Center in Moffett Field, California, and his colleagues analysed the six fragments and concluded that the meteoroid is one of several thought to have come from a parent asteroid that shattered in a collision 470 million years ago. This meteoroid broke

apart again in collisions 9 million and 4 million years ago. Measurements of accumulated radiation in the rock suggest that it suffered a final collision within the past

100,000 years.

The team also detected traces of carbon-rich organic molecules that somehow managed to survive.

Meteorit. Planet. Sci. 49, 1388–1425 (2014)

MICROBIOLOGY

Liquid layer for lung defence

Inhaling bacteria increases the production of mucus and liquid that trap and kill microbes in the airways.

A team led by Juan Iwanowski at the University of

Saskatchewan in Saskatoon, Canada, developed an imaging technique to visualize the depth of the protective layer that lines the airways. The researchers found that when the bacterium *Pseudomonas aeruginosa* was introduced into isolated pig tracheas, the airways secreted more of this film than unexposed tracheas.

The results could explain why patients with cystic fibrosis, who do not produce this layer properly, are prone to respiratory infections and inflammation. Boosting this previously unknown part of the immune response in these



MARINE ECOLOGY

Sick reefs repel young coral

Coral larvae actively avoid the smell of degraded marine ecosystems — potentially impeding efforts to rebuild damaged reefs.

Mark Hay at the Georgia Institute of Technology in Atlanta and his team studied coral reefs near Fiji (pictured). They focused on the behaviour of coral larvae in water from healthy, protected reefs and from reefs overgrown with seaweed.

Given the choice between the two streams of

water, *Acropora* coral larvae spent more than 85% of their time in water from the protected areas. The organisms also showed a similar preference for clean water containing chemical cues from a variety of corals, whereas seaweed cues decreased this preference.

Conservationists will probably need to boost coral-attracting chemicals when rebuilding seaweed-choked reefs, the authors suggest.

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