RESEARCH HIGHLIGHTS

Selections from the scientific literature

CHEMISTRY

Helium succumbs to pressure

Helium is a famously inert element, but researchers have made a stable compound from helium and sodium.

Artem Oganov at Stony Brook University in New York and his colleagues used an algorithm to look for potentially stable helium compounds and predicted that Na_2He could be made. They demonstrated this experimentally by subjecting thin pieces of sodium and helium gas to high pressures of up to 155 gigapascals. Above 113 GPa, the team noticed the formation of a stable crystalline compound, Na_2He, that is expected to remain stable up to at least 1,000 GPa. The crystal structure contains cubes of eight sodium atoms; half of these are filled with helium atoms, and the other half are each occupied by an electron pair, binding the sodium atoms together.

The finding could have implications for the understanding of noble gases, chemical bonding and giant gas planets such as Jupiter, which contain high levels of helium.

Nature Chem. **http://doi.org/bzkz (2017)**

MATERIALS

Hybrid film cools in the Sun

A material can cool surfaces by dissipating heat to outer space as infrared radiation, even when the Sun is at its peak. Similar materials developed previously worked only at night, or were not cost-effective enough to make on a large scale.

Xiaobo Yin and Ronggui Yang at the University of Colorado Boulder and their colleagues made a film by embedding glass microspheres in a transparent polymer matrix and coating the back of this with silver. The film reflected almost all sunlight, and the spheres interacted strongly with certain wavelengths of infrared radiation that are not absorbed by the atmosphere. The rate at which the film emitted this radiation into space was high enough to achieve a net cooling effect.

The material is relatively lightweight and easy to manufacture, potentially making it suitable as a low-cost cooling technology, say the authors.

Science **http://doi.org/bzk2 (2017)**

ISTOCK/GETTY

MICROBIOLOGY

Gut bacteria boost bee immunity

Gut microbes are important for digestion and immunity in humans — and may also be beneficial to bees.

Waldan Kwong at Yale University in New Haven, Connecticut, and his colleagues hand-reared larvae of the honeybee (*Apis mellifera*; pictured) in the laboratory. They allowed some bees to develop without gut bacteria, and inoculated others with bacteria found in nest-mates' stomachs. Compared with bees that lacked gut microbes, insects with bacteria made 28 times more apidaecin — an antimicrobial protein that protects against invading pathogens but doesn't seem to affect the gut bacteria. They also had higher survival rates when infected with the bacterium *Escherichia coli*.

The authors say that gut microbes, as well as other variables such as genetics, could affect the immunity of commercial bees, which are threatened by multiple pathogens.

R. Soc. Open Sci. **4, 170003 (2017)**

ECOLOGY

Toxic build-up in deep-sea life

High levels of industrial pollution have been found in animals living in the deepest reaches of the Pacific Ocean.

The production of polychlorinated biphenyls (PCBs) and polybrominated diphenyl ethers (PBDEs) — toxic, non-biodegradable pollutants — was phased out in the 1970s. Alan Jamieson, now at Newcastle University, UK, and his colleagues captured amphipods, a type of crustacean, at depths of between about 7,000 metres and 10,000 metres in the Kermadec and Mariana trenches of the Pacific Ocean. The team found PCBs and PBDEs in all samples at all depths. The highest levels of PCBs in the amphipods were 50 times greater than levels found in a survey of crabs in a highly polluted river in China.

The pollutants may have reached these remote areas by way of long-range atmospheric