Research highlights

IRONED OUT: A SNAG THAT STOPS USE OF PEE FOR ELECTRICITY

A catalyst containing nickel and iron can degrade the main waste product from urine, generating electricity and harmless by-products.

The compound urea, which mammals excrete in their urine, is energy-rich. In theory, it could be used to produce a stream of electrons — and so an electric current — as it is broken down into nitrogen and carbon dioxide. But harnessing this power is tricky because, as each urea molecule degrades, it generates six electrons that are difficult to corral, severely reducing the amount of electricity that can be harvested.

Ping Chen at Anhui University in Hefei, China, and colleagues prepared a catalyst containing nickel and iron atoms, which work together to corral urea's electrons. First, each of the catalyst's nickel atoms links with a urea molecule's oxygen atom. The nickel facilitates the urea's transformation into CO_2 and ammonia. Then, each of the catalyst's iron atoms grabs two ammonia molecules, combining them to form nitrogen gas and taking their electrons to generate an electric current.

The researchers hope that their catalyst could help to turn urine into a useful energy source.

Nature Energy **6**, 904–912 (2021)

ARABIAN CAMELS CARVED BY MASTERS OF THE STONE AGE

Stunning reliefs of camels in a rock formation in Saudi Arabia are much older than was first thought: they were carved more than 7,000 years ago, when the climate of the Arabian Peninsula was markedly cooler and wetter than it is today.

The life-sized sculptures at the Camel Site in northern Saudi Arabia were originally estimated to be roughly 2,000 years old. Maria Guagnin at the Max Planck Institute for the Science of Human History in Jena, Germany, and her colleagues combined results from a variety of dating methods, including analysis of surviving tool marks and fallen fragments of the sculptures. The camels were probably created before the end of the sixth millennium BC, when climate change had turned the Arabian Desert into lush grasslands. The revised estimates date the carvings to the Neolithic, or Stone Age, meaning that the camels are probably the world's oldest surviving large-scale animal reliefs.

Time and again, ancient builders seem to have restored the reliefs as the animal features eroded. The monuments might have retained their form and function for millennia until they began to crumble around 3,000 years ago, the scientists say.

J. Archaeol. Sci. Rep. https://doi.org/gw2s (2021)

FLEXIBLE VACCINE CAN TAKE ON MYRIAD CORONAVIRUSES

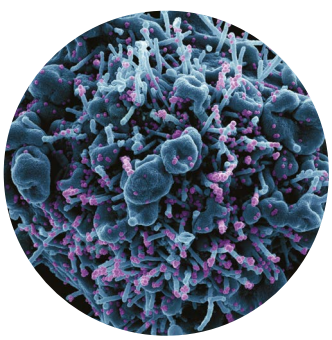
An experimental COVID-19 vaccine that uses an atypical ingredient to prompt an immune response has shown promise against several viral variants.

The mRNA COVID-19 vaccines stimulate the immune system by exposing it to the SARS-CoV-2 spike protein, which enables the virus to latch on to cells. David Veesler and Neil King at the University of Washington in Seattle and their colleagues instead made a vaccine based on a spike fragment called the receptor binding domain (RBD). They injected monkeys with nanometre-scale particles studded with dozens of RBDs; this generated virus-blocking 'neutralizing' antibodies against the Alpha, Beta and Gamma variants. The vaccine is currently in phase III clinical trials.

The team also tested similar vaccines containing RBDs from a mix of sarbecoviruses, a family of coronaviruses that includes SARS-CoV-2 (particles pictured in purple on cell). In mice, the vaccines triggered production of neutralizing antibodies against multiple coronaviruses.

These findings pave the way for a pan-sarbecovirus vaccine that could protect against SARS-CoV-2 variants and sarbecoviruses that jump from animals to humans in the future.

Cell https://doi.org/gw2r (2021)



BRIGHT NIGHT LIGHTS SCRAMBLE SWEET SONG OF CRICKETS

Around the world, night is marked by the male crickets' chirps, sounds they make by rubbing their raspy modified forewings together in an effort to attract females. But artificial lights can disrupt these melodies, experiments show.

To study how artificial light might affect this behaviour, called stridulation, Anat Barnea at the Open University of Israel in Ra'anana, Amir Ayali at Tel Aviv University in Israel and their colleagues raised field crickets (*Gryllus bimaculatus*, pictured) in one of four light regimes. Those that experienced bright days and pitch-black nights tended to move about during the day and stridulate at night. Those that experienced dim or bright nights showed disrupted or even random patterns of movement and stridulation, often falling out of sync with their fellow crickets.

The severity of the behavioural disruption correlated with the brightness of night. Stridulation, in particular, was disrupted by even very dim light at night. The researchers urge further research into the ecological effects of this discombobulation.

Proc. R. Soc. B **288**, 20211626 (2021)

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