

Research highlights

AN ANCIENT PEOPLE REBUILT THEIR DESECRATED DEAD

Centuries ago, people living on South America's Pacific Coast stacked the remains of human spines onto reed sticks – a practice that could have served to piece together the damaged skeletons of their dead.

The Chincha people flourished in one of southern Peru's largest valleys from about AD 1000 until the arrival of Europeans in the sixteenth century, when most of the Chincha population was wiped out by disease, famine and political turmoil. While surveying ancient graves in the Chincha Valley, Jacob Bongers at the University of East Anglia in Norwich, UK, and his colleagues documented 192 reed sticks with human vertebrae threaded onto them; one stick was also capped with a human skull. Almost all of the 79 strings of bones that the team examined seem to have been made from the remains of a single person no later than 40 years after their death.

The researchers estimate that the items were created about 450 years ago, around the time that newly arrived Europeans opened and robbed many graves. Chincha people might have threaded vertebrae onto sticks to reconstruct their dead after their remains were damaged by tomb raiders, the authors say.

Antiquity <https://doi.org/hfvs> (2022)



WHALES SCHOOL ONE ANOTHER ON HOW TO SNATCH A SNACK

Killer whales have invented a behaviour and are teaching it to one another, much as humans once shared bronze smelting and today's Internet users spread the latest TikTok dance challenge.

Morgane Amelot, then at Deakin University in Melbourne, Australia, and her colleagues, investigated killer whales (*Orcinus orca*, pictured), or orcas, living near the Crozet Islands in the southern Indian Ocean. Since the commercial harvesting of Patagonian toothfish (*Dissostichus eleginoides*) began in 1996, many orcas have learnt to pluck the fish from commercial fishing lines and devour them. The team looked at photos of whales from two populations that take fish from lines, and identified 236 individuals from their unique body markings.

Between 2003 and 2014, the size of the nearshore population remained roughly the same, but the number of whales from this population that fed on line-caught toothfish rose from 34 to 94. The number of deep-water orcas using the technique rose from 17 to 43 from 2010 to 2017. Both trends suggest that the behaviour is spreading as new orcas learn it – a cetacean #ToothfishChallenge.

Biol. Lett. **18**, 20210328 (2022)

GAS STOVES HELP TO COOK THE CLIMATE — EVEN SWITCHED OFF

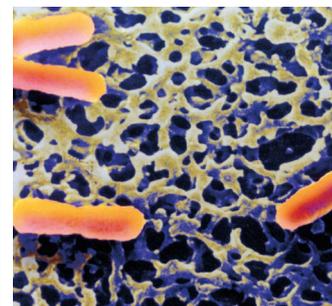
Gas-burning stoves and ovens in the United States alone could be adding half a million cars' worth of greenhouse gases to the atmosphere every year.

About one-third of residential kitchens in the United States are fitted with natural-gas stoves and ovens. Natural gas is composed mainly of methane, a greenhouse gas that hangs around in the atmosphere for less time than carbon dioxide, but has a much more potent warming effect. Burning methane destroys it; however, some unburnt gas inevitably escapes during cooking and from leaks in pipes.

To test how much of the gas ends up in the surrounding air, Eric Lebel, then at Stanford University in California, and his colleagues measured methane output from gas stoves and ovens in 53 US homes. The team found that the appliances release between 0.8% and 1.3% of the gas they use as unburnt methane.

Although some of that methane was lost during cooking, 76% escaped while the appliance was turned off. These numbers suggest that, on a national level, gas stoves and ovens have the same climate impact as the annual carbon dioxide output of 500,000 petrol-powered cars.

Environ. Sci. Technol. <https://doi.org/gn93nn> (2022)



LETHAL BACTERIA GROWING RESISTANT TO CRUCIAL DRUGS

Shigella bacteria cause nearly one in six diarrhoea-related deaths worldwide and are the top cause of severe childhood diarrhoea in low- and middle-income countries. These pathogens are becoming highly resistant to key antibiotics, particularly in regions where the drugs are widely used – making them even more dangerous.

To assess the properties of circulating *Shigella* bacteria, Kate Baker at the University of Liverpool, UK, and her colleagues analysed 1,246 *Shigella* genomes collected between 2007 and 2011 from 7 countries in sub-Saharan Africa and South Asia. They found that 95% of the samples were resistant to 3 or more classes of antibiotic.

All four analysed *Shigella* species (including *S. flexneri*, pictured) were becoming resistant to fluoroquinolones, a drug class that includes ciprofloxacin, the current treatment recommended by the World Health Organization. Levels of fluoroquinolone resistance were higher in *Shigella* found in Asia – where those drugs are more frequently used – than in *Shigella* in Africa.

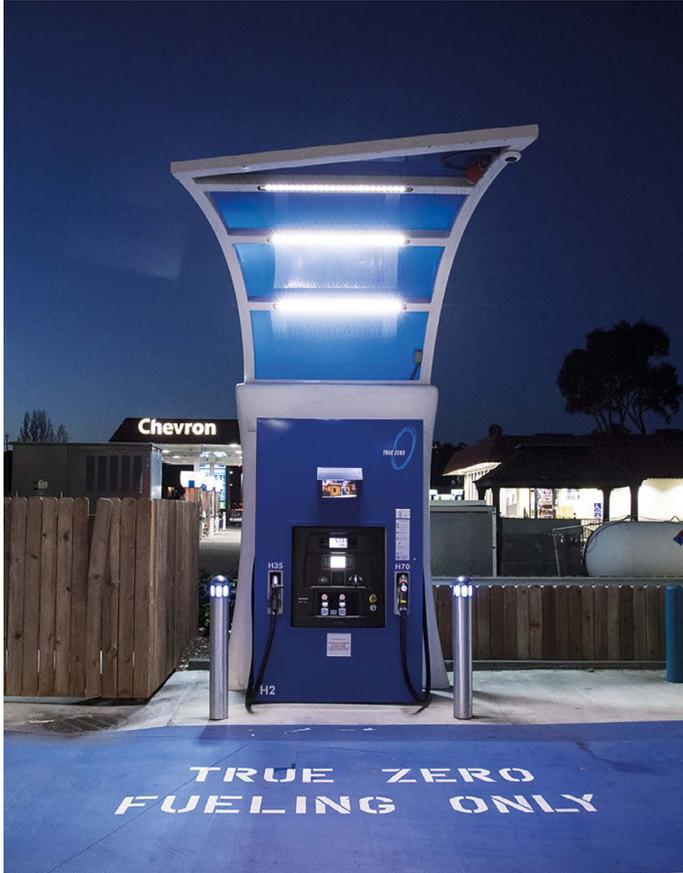
These findings highlight the need to reconsider treatment guidelines for *Shigella* infections and to develop vaccines to reduce reliance on antibiotics.

Nature Microbiol. **7**, 251–261 (2022)



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DARK ENERGY: A WAY TO USE THE POWER OF SUNSHINE AT NIGHT



Some fuel pumps dispense hydrogen, but the gas is difficult to store.

A molecule can harness solar power to generate hydrogen, a clean fuel, on demand – even when it's dark.

Using solar cells to produce hydrogen generates energy that is available when the Sun isn't shining, but hydrogen is expensive to store. Hydrogen can also be made using batteries charged with solar power, but the process is often inefficient.

Carsten Streb at Ulm University in Germany and his colleagues created a molecule that can store sunlight energy chemically, and later use this energy to release hydrogen on demand. The researchers crafted a chemical compound from a large metal oxide bonded to two

light-sensitive molecules based on ruthenium, a rare metal. They put molecules of the compound in a solution containing the salt sodium ascorbate.

When the ruthenium-based section was hit by light, its atoms absorbed energy, which allowed the attached metal oxide to pick up and store electrons from the salt. This 'liquid fuel' was stable for more than 24 hours.

Finally, the team added an acid. The electrons combined with the acid's hydrogen ions to make hydrogen gas. This work provides a blueprint for future liquid energy-storage systems.

Nature Chem. <https://doi.org/gpbm5n> (2022)

DATABASE REVEALS CLUES TO CAUSES OF CANCERS' SPREAD

Scientists have identified a trove of genetic mutations that are linked to the development of metastatic cancer. These mutations could act as cancer cells' navigation apps, providing directions that allow malignancies to spread from one organ to another.

Most deaths from cancer are caused by tumour cells leaving the organ where they formed and colonizing other parts of the body. Despite decades of research, scientists still don't know all of the triggers that initiate this spread, called metastasis. Nikolaus Schultz at the Memorial Sloan Kettering Cancer Center in New York City and his colleagues mined a database to identify more than 20,000 people with metastatic cancer, then analysed the cancers' genetic sequences to try to understand their spread.

The team uncovered a plethora of possible genetic triggers. Mutations in particular genes were associated with metastasis from one organ to another, with the known cancer-associated gene TP53 a common culprit. The authors suspect that many of these mutations destabilize cancer cell genomes, and that subsequent chromosomal changes send cancer into migration mode.

The research will help scientists to develop treatments that stop cancer from spreading.

Cell **185**, 563–575 (2022)



VACCINATE PARENTS TO PROTECT KIDS FROM COVID

Parents vaccinated against COVID-19 shield their unvaccinated children from infection with the Alpha and Delta variants of SARS-CoV-2, according to a study of more than 150,000 households in Israel.

More than two-thirds of Israel's residents have had the Pfizer–BioNTech jab. To study the vaccine's full effects, Noam Barda at Ben Gurion University of the Negev in Beersheba, Israel, and his colleagues analysed health-record data collected during two waves of COVID-19, when schools were partially closed.

Between January and March 2021, when Alpha was dominant, children under the age of 16 were about 72% less likely to get infected if they lived with two fully vaccinated parents than if they lived with two unvaccinated parents. From July to September 2021, when Delta was dominant, children under 12 were 58% less likely to become infected if both parents had received a booster jab than if they had received only two vaccine doses.

The vaccines probably protected kids by reducing the risk of parents getting infected in the first place. If they did get infected, vaccinated parents were also less likely than unvaccinated parents to spread the infection to their unvaccinated children.

Science <https://doi.org/hf5n> (2022)