

# Research highlights

## THE HUMAN COST OF COAL-POWERED PLASTIC PRODUCTION

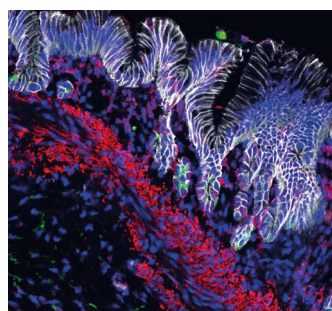
Plastic production has soared in countries that rely heavily on coal for energy, leading to a rise in carbon emissions and particle pollution – which, in turn, has led to a steep increase in illness and death.

Livia Cabernard at the Swiss Federal Institute of Technology in Zurich and her colleagues analysed the environmental and socio-economic impacts of plastics use throughout the global value chain. They found that emissions of both carbon and particulate matter from plastics manufacture doubled between 1995 and 2015, owing mainly to the rising production in China, Indonesia and other countries that depend on coal for a large share of their energy production.

The team found that, globally, more than 6% of electricity generated from coal is used to make plastics, but there are large regional differences. Industries in the United States and the European Union are outsourcing energy-intensive plastics production to coal-based Asian economies, and plastic-related emissions, such as those from Indonesia's electronics industry, have increased more than 50-fold.

Coal must quickly be replaced with renewable energy sources to tackle the growing carbon footprint of global plastic production, the researchers say.

*Nature Sustain.* <https://doi.org/gnpm4p> (2021)



## GUT INSTINCT: LAB-GROWN ORGANS ACT LIKE THE REAL THING

Scientists have created a sophisticated mini-stomach, complete with nerves that coordinate muscle contraction and glands that make acid, providing hope that such 'organoids' could one day be used to repair damaged gastrointestinal tracts.

Many stomach organoids consist only of epithelial cells, the basis of the tissue that lines body cavities. James Wells at Cincinnati Children's Hospital in Ohio and his colleagues instead grew a stomach organoid (pictured) from a combination of three cell types found in developing embryos: epithelial, enteric neural crest and mesenchymal.

After growing the organoid in an incubator, the researchers transferred it into a mouse, where it matured, possibly because it was fed by the host's blood supply. An oesophageal organoid grown from the same three cell types also had characteristics of a human oesophagus, showing that the technique could be used to grow many types of organoid.

Although the team's stomach organoids still lack blood vessels and immune cells, they're the most complete organoids of their type created so far.

*Cell Stem Cell* <https://doi.org/g8vd> (2021)

## SULFUR'S STENCH LENDS CANNABIS ITS STINK OF SKUNK

Add cannabis to the list of pungent plants that get their strong smell from sulfur.

As the recreational drug becomes legal in more places, its smell, reminiscent of a skunk's stench, is also becoming more common. More than 200 volatile compounds have already been identified in the scent of *Cannabis sativa* (pictured), the plant from which cannabis is derived, but most contribute floral or citrusy notes.

Iain Oswald at the company Abstrax Tech in Tustin, California, and his colleagues suspected that volatile sulfur-containing molecules similar to those in garlic and other pungent foods might give cannabis its stink.

The team analysed extracts from various cannabis cultivars using a custom-built instrument that can efficiently separate numerous compounds, even if they occur at very low concentrations, and can detect sulfur-containing molecules. The authors identified several previously unreported sulfur compounds, then reverse-engineered the scent of cannabis by adding a key sulfur-containing molecule, 3-methyl-2-butene-1-thiol, to an existing formulation, and confirmed that it contributes the skunky note.

*ACS Omega* **6**, 31667–31676 (2021)



## IMPORTED SNAKES GUZZLE SPANISH ISLAND'S LIZARDS

Two of the three native reptiles on Gran Canaria have nearly vanished from some parts of the Spanish island – eaten by an invasive snake species originally imported as a pet.

Native to western North America, the California kingsnake (*Lampropeltis californiae*) was first brought to Gran Canaria in 1998; it became an invasive species after individuals that escaped or were set free started to mate and proliferate. Julien Piquet and Marta López-Darias at the Institute of Natural Products and Agrobiology in La Laguna, Spain, compared the abundance of Gran Canaria's native lizards in regions with California kingsnakes and regions without.

The researchers found that in areas invaded by the snakes, the number of native giant lizards (*Gallotia stehlini*, pictured) dropped by more than 90% and that of a local skink species (*Chalcides sexlineatus*) fell by more than 80%. In the same regions, the population of native geckos (*Tarentola boettgeri*) was halved.

The authors call for innovative measures to manage invasive snakes on Gran Canaria.

*Proc. R. Soc. B* **288**, 20211939 (2021)