

that only about half of them were diagnosed within five days of the onset of symptoms. In hopes of prolonging the window during which Paxlovid is useful, DNDi wants to test the drug in combination with an inhalable steroid called budesonide, to see whether this can delay the onset of harmful immune responses that often drive later stages of COVID-19. The initiative also had ambitions to test Paxlovid in combination with the antidepressant fluoxetine (Prozac), if results from its other fluoxetine trials show that the drug has antiviral properties, says Strub-Wourgaft.

Cohen is concerned about a clause in Pfizer's agreement with the Medicines Patent Pool that requires the companies to obtain permission from Pfizer before combining their generic Paxlovid with other products, or from giving their drugs to researchers who intend to study combinations.

Pfizer did not respond to queries from *Nature* about why it would not allow companies to use the drug for combination studies without its permission.

It is not unusual for drug companies to hesitate to allow external researchers to conduct studies with medicines such as Paxlovid that are not yet fully approved by regulators, says Cohen. But she adds that delays and a lack of transparency on what the company is studying are surprising. "We have always said that we are happy to collaborate with them," she says.

John Amuasi, a principal investigator on the ANTICOV study at the Kumasi Center for Collaborative Research in Tropical Medicine in Ghana, agrees. With just 15% of the country fully vaccinated, he's anxious to obtain the drug for both treatment and research purposes. "We think this could be a game-changer in an emergency situation."

science and impacts of climate on humans and ecosystems.

Coming more than three decades after the panel's first climate assessment, the sixth instalment delivers the most forceful warning yet about the consequences of inaction. The question now, scientists say, is whether governments will at last step up to the challenge with actions rather than unfulfilled pledges.

"Despite more mitigation efforts by more governments at all scales, emissions continue to increase," says Karen Seto, a geographer at Yale University in New Haven, Connecticut, and a coordinating lead author on the report. "We need to do a lot more, and we need to do it quickly."

### Good news, bad news

The report makes clear that current energy, economic and political trends are putting the world on course to shoot well past 1.5 °C of warming. Models suggest that global emissions need to peak by 2025, at the latest, and then decline rapidly for the world to have even a 50% chance of limiting warming to 1.5 °C – an unlikely scenario. Scientists have long been warning of this, but some say it's time to start thinking about what that means in terms of climate strategy.

"I think we are getting closer politically to a situation where we seriously have to ask how we are going to deal with that overshoot," says Oliver Geden, a social scientist with the German Institute for International and Security Affairs in Berlin and a lead author on the report. Although it still might be technically possible to limit warming to 1.5 °C, he says, the actions required would be unprecedented.

But the report provides reason for optimism by highlighting climate technologies

## EXTREME STEPS NEEDED TO AVERT CLIMATE DISASTER

Latest IPCC report says some atmospheric carbon removal is needed to limit global warming to 1.5 °C.

By Jeff Tollefson

**H**umanity probably isn't going to prevent Earth from at least temporarily warming 1.5 °C above pre-industrial levels – but aggressive action to curb greenhouse-gas emissions and extract carbon from the atmosphere could limit the increase and bring temperatures back down, according to the latest report from the United Nations Intergovernmental Panel on Climate Change (IPCC). The report makes it clear, however, that the window is rapidly closing, and with it the opportunity to prevent the worst impacts of global warming. Above the 1.5 °C limit – set by the Paris climate agreement in 2015 – the chances of extreme weather and collapsing ecosystems grow.

"The IPCC tells us that we have the knowledge and technology to get this done," Inger Andersen, executive director of the UN Environment Programme, said at the press conference for the report's release on 5 April. "But increased action must begin this year, not next year; this month, not next month; and indeed today, not tomorrow."

Approved by 195 governments after a marathon negotiating session that ran over schedule by two days, the roughly 2,900-page report focuses on options for curbing emissions and

mitigating the impacts of global warming. The document, compiled by hundreds of scientists across 65 countries, is the last of a trilogy comprising the IPCC's sixth climate assessment. The first two reports cover the underlying



Bright spot: renewable energy sources, such as wind turbines, have dropped in cost.

## News in focus

and policies that are already driving emissions down in many countries. For instance, the price of renewable-energy technologies, such as wind turbines, solar panels and batteries, is plummeting. And global energy intensity – a measure of the amount of energy required to drive the economy – decreased by 2% annually between 2010 and 2019, reversing the trend from the previous decade.

The immediate goal is to accelerate those efforts, says Nathaniel Keohane, president of the Center For Climate and Energy Solutions, an environmental think tank in Arlington, Virginia, and a White House adviser under former

US president Barack Obama. In the longer term, governments need to invest in research and development activities to explore the feasibility of carbon-removal technologies that could help to bend the curve in decades to come, he adds.

This will offset residual greenhouse-gas emissions from sectors that are harder to clean up, such as industry and aviation. Nations could bolster carbon uptake by expanding forests and improving agricultural practices, the report says.

“It’s a Herculean effort, and so we better get started,” Keohane says.

# ANCIENT SMELLS REVEAL SECRETS OF EGYPTIAN TOMB

## Jars contained fish, fruit and beeswax balm to sustain the tomb’s residents in the afterlife.

By Colin Barras

**M**ore than 3,400 years after two ancient Egyptians were laid to rest, the jars of food left to nourish their eternal souls still smell sweet. Researchers analysed these scents to help identify the jars’ contents (J. La Nasa *et al.* *J. Archaeol. Sci.* **141**, 105577; 2022). The study shows how the archaeology of smell can enrich our understanding of the past – and perhaps make museum visits more immersive.

The 1906 discovery of the intact tomb of Kha and Merit in the Deir el-Medina necropolis near Luxor was a landmark moment in Egyptology. The tomb of Kha – a ‘chief of works’, or an architect – and Merit, his wife, remains the most complete non-royal ancient burial ever found in Egypt, revealing important information about how high-ranking individuals were treated after death.

“It’s an amazing collection,” says Ilaria Degano, an analytical chemist at the University of Pisa, Italy.

Unusually for the time, the archaeologist who discovered the tomb resisted the temptation to unwrap the mummies or peer inside the sealed jars and jugs there, even after they were transferred to the Egyptian Museum in Turin, Italy. The contents of many of these vessels are still a mystery, although there are some clues, says Degano. “From talking with the curators, we knew there were some fruity aromas in the display cases,” she says.

Degano and her colleagues placed various artefacts – including sealed jars and open cups laden with the rotten remains of ancient food – inside plastic bags to collect some of the volatile molecules they still release. Then the team used a mass spectrometer to identify components of the aromas from each sample. They found aldehydes and long-chain hydrocarbons, indicative of beeswax; trimethylamine, associated with dried fish; and other aldehydes common in fruits. The findings will feed into a larger project to re-analyse the tomb’s contents and produce a more comprehensive picture of burial customs for non-royals that existed when Kha and Merit died.

Odour analysis is still an underexplored area of archaeology, says Stephen Buckley, an archaeologist and analytical chemist at the University of York, UK. “Volatiles have been ignored by archaeologists because of an assumption they would have disappeared from artefacts,” he says. But “if you want to understand the ancient Egyptians, you really want to go into that world of smell”.

For example, sweet-smelling incense derived from aromatic resins was essential for the ancient Egyptians’ temple ceremonies and mortuary rituals. Because resin-producing trees didn’t grow in Egypt, this necessitated ambitious long-distance expeditions.

### Enriched exhibits

Aside from revealing more about past civilizations, ancient smells could add a dimension to the visitor experience at museums. “Smell is a relatively unexplored gateway to the collective past,” says Cecilia Bembibre at University College London. “It has the potential [to allow] us to experience the past in a more emotional, personal way.”

But reconstructing ancient smells is not easy, says Bembibre. Degradation and decomposition can be a smelly business, so the scents from an artefact today do not necessarily match what Bembibre calls the original “smellscape” of a tomb.

With the right knowledge and understanding, it should be possible to pull the original and the decomposition scents apart, says Buckley. Whether visitors would actually want to experience the full and potentially unpleasant smellscape of an ancient tomb is still up for debate. “Curators might want to give people a choice over how far they want to push the smell experience,” says Buckley.



This papyrus from from the tomb shows Kha and Merit worshipping the lord of the afterlife.