

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

More 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.