

convert their kinetic energy into heat and slow down when turbulence kicks in. Turbulence spreads energy into increasingly tiny eddies, which, at their smaller scale, increase local viscosity. Much like friction between solid objects, this viscosity acts to increase resistance to movement between layers of fluid, and thereby dissipates kinetic energy as heat.

Mathematicians are pushing exploration of low-viscosity fluids to its ultimate limit. Physicist, chemist and mathematician Lars Onsager suggested in 1949 that, in theory, a fluid could still dissipate energy even if its viscosity were to become vanishingly small, or zero (a situation never seen in the real world). In this hypothetical scenario, the fluid's motion will keep dispersing into infinitesimally small eddies, where it will still die out eventually. "That was kind of a shocking idea," says Philip Isett, a mathematician at the University of Texas at Austin.

Onsager conjectured that turbulence could slow non-viscous fluids only under particular conditions; in other cases, the fluids would keep flowing for ever, as might be expected. In the 1990s, Gregory Eyink, a theoretical physicist at Johns Hopkins University in Baltimore, Maryland, proved that this idea was correct. And in a paper that he posted online last year<sup>2</sup>, Isett published solutions to the Navier–Stokes equations, showing that some zero-viscosity flows can indeed slow and stop because of turbulence alone. His work is due to appear in the *Annals of Mathematics*.

The motions of the fluids described by these solutions are not very realistic: they start at rest, begin to move and then grind to a stop. But this year, other mathematicians, including Camillo De Lellis of the University of Zurich in Switzerland and László Székelyhidi of the University of Leipzig in Germany, found slightly more realistic solutions to the same equations, in which initially moving fluids slow down<sup>3</sup>.

Physicists might pay attention to the latest mathematical work only when it becomes more relevant to the real world, Székelyhidi says. A start would be to find solutions describing a fluid that begins with viscosity and gradually becomes infinitesimally thin. But Charles Doering, a mathematical physicist at the University of Michigan in Ann Arbor, hopes that the approach might point the way to a model of turbulence that is simpler to use than the Navier–Stokes equations, and works in all situations. That is the "grand dream", he says. ■

- Cardesa, J. I., Vela-Martín, A. & Jiménez, J. *Science* <http://dx.doi.org/10.1126/science.aan7933> (2017).
- Isett, P. Preprint at <http://arxiv.org/abs/1608.08301> (2016).
- Buckmaster, T., de Lellis, C., Székelyhidi, L. Jr & Vicol, V. Preprint at <http://arxiv.org/abs/1701.08678> (2017).

## SOUTH AFRICA

# Theft triggers doubt over artefact loans

*Robbery may stall effort to display materials at sites of origin.*

BY SARAH WILD

When thieves stole some centuries-old golden artefacts from a South African park in December, they did more than just spirit away archaeological treasures. The robbery has triggered an outcry among academics, who have only just heard of the theft, and raised questions about growing efforts to return culturally important materials to the region where they were found.

Archaeologists and curators from major museums worry that smaller, local facilities sometimes fall short on security and cannot preserve artefacts properly, leaving them at risk. "There is always a trade-off of security versus local relevance and tourism benefits at remote regional museums," says Kevin MacDonald, an archaeologist at University College London. "If I were custodian of such materials, I would think twice before putting them into vulnerable situations."

The stolen artefacts include a necklace, bracelets and beads excavated from two graves at the Thulamela archaeological site, which was inhabited between the thirteenth and seventeenth centuries. This site is located in Kruger National Park, and the artefacts were on loan to the park when they were stolen from a small museum there. In South Africa, heritage legislation encourages that artefacts be stored in their province of origin. However, only universities and museums have the accreditation to store them permanently. The Thulamela relics are usually housed at the Ditsong National Museum of Cultural History in Pretoria.

The robbery leaves a gap in the history of the gold trade in southern Africa, says Sian Tiley-Nel, who manages the museums at the University of Pretoria. Tiley-Nel oversees a group of artefacts discovered at what was once the kingdom of Mapungubwe in the north of South Africa. Thulamela and Mapungubwe saw the most significant archaeological gold discoveries in southern Africa, she says. "Gold artefacts are an extreme rarity and that is why the Thulamela theft is a travesty."

## ROADBLOCK TO RETURN

The theft is also hampering discussions about moving other artefacts to locations under the authority of South African National Parks, or SANParks, a government-supported conservation body. Researchers at other institutions say



ARIADNE VAN ZANDBERGEN/ALAMY/LAMY

The Thulamela site in Kruger National Park.

that SANParks has been seeking to become an official repository for about a decade, and it has a number of artefacts on loan from both the Thulamela and Mapungubwe collections. But Tiley-Nel says that the University of Pretoria has serious concerns about the state of the Mapungubwe collection on loan to SANParks.

"Site inspections have revealed deteriorating conditions, poor curation and improper collections management practices at the Mapungubwe Interpretation Centre, which was not originally designed to house original museum material," she says. The University of Pretoria and other curators say that they are considering withdrawing their artefacts from SANParks and halting talks about future loans.

A SANParks spokesperson disputed Tiley-Nel's criticisms of the conditions in its facilities. "SANParks has a duty to tell the full story about its parks, and where it necessitates exhibiting artefacts, steps are taken to put such on display," the spokesperson added. ■

## CORRECTION

The News Feature 'China's push for better babies' (*Nature* **548**, 272–274; 2017) contained an image of infants in a Hong Kong hospital that was not relevant to the subject matter. The picture in the PDF has been replaced with more-appropriate imagery.