



*Frontispiece 1. Aerial photograph of the excavation in July 2021 of an early medieval burial site within a penannular ditch on Ex Ring Giver on Salisbury Plain, UK. Investigations recovered 21 burials with associated grave goods, probably dating to the seventh century AD. The site is located on land owned by the Ministry of Defence, part of the largest military training area in the UK. The project is organised by Operation Nightingale, an initiative to support the recovery of military personnel and veterans through involvement in archaeological investigations. The Ex Ring Giver excavation is a collaboration between the veteran support organisation, Breaking Ground Heritage, the UK Government's Defence Infrastructure Organisation and a commercial archaeology unit, Wessex Archaeology (photograph: WO1 Morris; © Crown).*



*Frontispiece 2. A 3D-photogrammetric model of the Hohlenfels cave complex, near Ulm, Baden-Württemberg, Germany. The cave is one of six that form the ‘Caves and Ice Age Art in the Swabian Jura’ UNESCO World Heritage Site. The group was inscribed in 2017 in recognition of some of the world’s earliest evidence of human artistic development, dating to the Aurignacian (c. 43 000–33 000 years ago). The complete model of the Hohlenfels cave complex uses around 8600 digital photographs; the excerpt here shows the area of the University of Tübingen excavations, which have recovered musical instruments and mammoth ivory figurines. The QR code gives access to the 3D model in Sketchfab (© Landesamt für Denkmalpflege im Regierungspräsidium Stuttgart; model: C. Steffen & M. Steffen).*



# EDITORIAL

## Climate control

As the Olympic flame was extinguished at this year's delayed Tokyo games, wildfires burned around the ruins of ancient Olympia in Greece. Over the summer, fires also spread across other parts of Greece, around the Mediterranean, along the West Coast of North America and across Siberia. Meanwhile, parts of China, Germany, India, Japan, the Netherlands, Turkey and the US experienced torrential rain leading to catastrophic flooding, landslides, the destruction of property and loss of life. In the midst of this summer of climate chaos, the Intergovernmental Panel on Climate Change (IPCC) published its latest Assessment Report.<sup>1</sup> The document presents the current state of scientific knowledge about the climate, models for how it will change in the future under different conditions and what needs to be done to avert the worst of these scenarios. The authors use carefully calibrated language to convey the precise level of certainty around the evidence and its interpretation: low, medium, high and very high confidence. No such caveats, however, are deemed necessary around the report's starting premise: "It is unequivocal that human influence has warmed the atmosphere, ocean and land" (Figure 1).<sup>2</sup> The following 4000 pages make for grim reading: "Global mean sea level has risen faster since 1900 than over any preceding century in at least the last 3000 years (high confidence)"; "Global surface temperature has increased faster since 1970 than in any other 50-year period over at least the last 2000 years (high confidence)"; "Temperatures during the most recent decade (2011–2020) exceed those of the most recent multi-century warm period, around 6500 years ago (medium confidence)"; and "In 2019, atmospheric CO<sub>2</sub> concentrations were higher than at any time in at least 2 million years (high confidence)". In other words, across a range of metrics, it is necessary to look ever further back in time to find climatic conditions comparable with those of today.

The IPCC report underpins the 2021 United Nations Climate Change Conference, or COP26, in Glasgow from 1–12 November (<https://ukcop26.org>). Delayed for a year by the COVID-19 pandemic, COP26 is widely seen as the last chance for international agreement to secure the action required to halve emissions over the next decade and achieve global net zero by 2050, in order to limit temperature rise to 1.5°C. Unprecedented political consensus will be needed to agree and implement policies to decarbonise economies, restore ecosystems and transform infrastructure and lifestyles. How we generate and consume energy,

<sup>1</sup> Intergovernmental Panel on Climate Change. 2021. *Climate change 2021: the physical science basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change*. Cambridge: Cambridge University Press.

<sup>2</sup> Intergovernmental Panel on Climate Change. 2021. Summary for policymakers, in *Climate Change 2021: the physical science basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change*. Cambridge: Cambridge University Press.

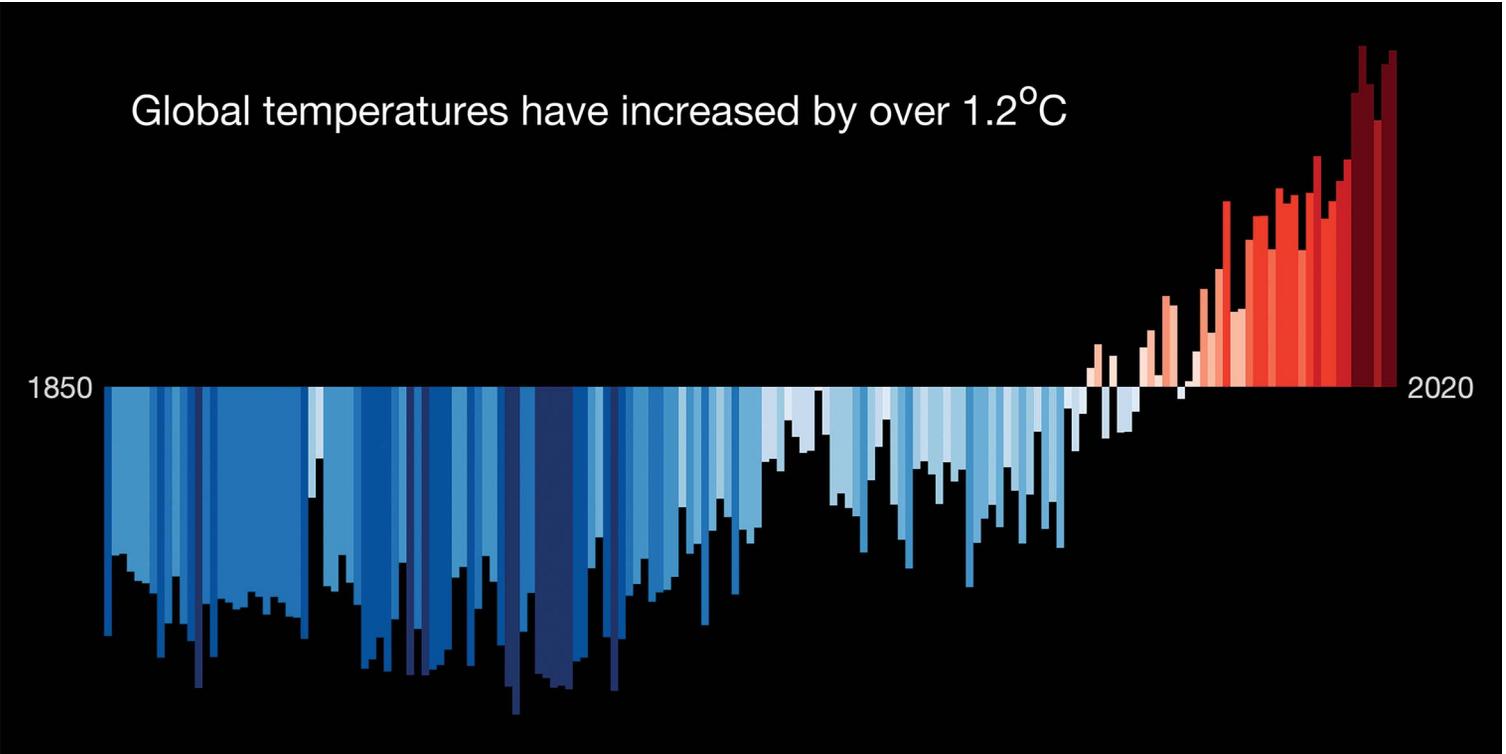


Figure 1. Global temperature change, 1850–2020 (<https://showyourstripes.info>. Ed Hawkins, CC BY 4.0).

how we work and travel, how we produce food, and what we eat will all need to change if we are to bring emissions under control.

What is the role of archaeology in all of this? Climate change is already having deleterious effects on the archaeological record, and these will increase in number and severity, whether due to wildfires, melting ice, rising sea levels or falling water tables. Growing numbers of projects focus on mitigation and digital recording of heritage resources under existential threat, for example in the low-lying Maldives.<sup>3</sup> But beyond the effects of climate change on the archaeological record, can archaeology offer anything to help turn the rising tide? In a 2008 *Antiquity* article titled ‘Practising archaeology at a time of climatic catastrophe’, Peter Mitchell identified an

*archaeological responsibility [...] that derives from the fact that the timescales on which we work offer unique opportunities to examine and understand the interaction of climatic, ecological, demographic, economic, sociopolitical and ideological variables.*<sup>4</sup>

In other words, it is specifically by integrating the long-term archive of evidence for human ecosystems—the recursive relationships between people and their dynamic environments—that archaeologists can contribute most effectively to climate change research and adaptation policy-making. Particularly important are archaeological studies of those environments that are critical to efforts to capture and store carbon, such as tropical rainforests and temperate peatlands—studies that remind us of the integral role of humans in the creation of such environments in the first place.

The list of relevant archaeological case studies is endless, including: human adaptive responses to multi-decadal drought in the US Southwest or to the Mid-Holocene drying of the Sahara; fluctuating sea levels across Island Southeast Asia in the Pleistocene or the submergence of Doggerland beneath the North Sea in the Early Holocene; floods of unimaginable scale along the Yangtze and Yellow Rivers; and the failure of crops, such as maize and millet, as a result of changing temperatures. Such studies point to diverse human responses and adaptations, from conflict and collapse to shifting subsistence systems and technological innovation. In many cases, the response has been mobility—an option that is ever harder to contemplate in the contemporary world, although one that will surely be necessary.<sup>5</sup> But we can look to other adaptations too, such as types of architecture and building materials that are better suited to mitigating the effects of storms, heat or flooding, and to types of farming that are less damaging to soils.<sup>6</sup> A recent study of the Asian summer monsoon, for example, integrates palaeoenvironmental and archaeological data to examine human

<sup>3</sup> FEENER, R.M. *et al.* 2021. The Maldives Heritage Survey. *Antiquity* Project Gallery 95: e16. <https://doi.org/10.15184/aqy.2021.45>

<sup>4</sup> MITCHELL, P. 2008. Practising archaeology at a time of climatic catastrophe. *Antiquity*, 82: 1093–103. <https://doi.org/10.1017/S0003598X00097805>

<sup>5</sup> SHAH, S. 2020. *The next great migration: the story of movement on a changing planet*. London: Bloomsbury;

XU, C. *et al.* 2020. Future of the human climate niche. *Proceedings of the National Academy of Sciences of the USA* 117: 11350–55. <https://doi.org/10.1073/pnas.1910114117>

<sup>6</sup> LOGAN, A.L. *et al.* 2019. Usable pasts forum: critically engaging food security. *African Archaeological Review* 36: 419–38. <https://doi.org/10.1007/s10437-019-09347-9>

responses to changing temperatures and precipitation across the Holocene.<sup>7</sup> Critically, it also considers future climate change and how we might make use of adaptive strategies of the past, such as crop diversification and the revival of landraces that preserve water and soil fertility.

Such examples illustrate Mitchell's sense of 'archaeological responsibility' through the provision of unique data and interpretations that have the potential to assist other specialists and wider society in better understanding climate change. Despite this, publications by archaeologists over the past decade have noted repeatedly that our insights do not feature prominently in the analyses and reports of climate scientists and policy-makers.<sup>8</sup> In this context, the Debate section featured in our August issue, on the relevance of archaeology and the challenges of communicating with other specialists, raised pertinent questions about language, scientific rigour and collaboration.<sup>9</sup> Clearly, we need to do more than simply collect data and to convince ourselves of our own relevance—communication is vital. Some climate scientists, for example, are looking to the social sciences and humanities for ways to communicate with non-specialists.<sup>10</sup> As professional narrative-builders, archaeologists are well positioned to explore how we use the power of 'storytelling' to reach wider audiences. Moreover, with expertise on the artefacts, sites and landscapes that are integral to peoples' identities, we also have the means through which to engage and motivate action.

Two articles in the current issue address different aspects of climate change. Sołtysiak and Fernandes examine the debate around the effects of the 4.2kya climatic event on Bronze Age communities in northern Mesopotamia. Increased aridification during the late third millennium BC has long been linked to the collapse of the Akkadian Empire and decline of Old Kingdom Egypt, although the exact chronologies and the nature of any link are debated. Sołtysiak and Fernandes use stable isotope analysis of human teeth and bone to assess trends in subsistence at Syrian Bronze Age sites before, during and after the 4.2kya event. The results show no clear evidence for a major shift in subsistence practices, such as in human diet or a more extensive exploitation of the dry steppe. In this part of Mesopotamia, at least, local communities were able to adapt to climate change in order to maintain their existing lifestyles.

Compared to the 4.2kya event, current climate change is of a different order of magnitude, even if the Anthropocene is still to be recognised officially by the International Committee on Stratigraphy. In his article, Peter Campbell turns to the effects of current climate change on the archaeology of the future past. At the core of his vision of archaeological thinking and practice is a redefinition of the archaeological record as a 'hyperobject', extending far beyond the traditional definition of material culture to encompass the impact of anthropogenic activity at scales ranging from the molecular to the planetary. Future archaeologists will therefore

<sup>7</sup> CLIFT, P.D. & J. D'ALPOIM GUEDES. 2021. *Monsoon rains, great rivers and the development of farming civilisations in Asia*. Cambridge: Cambridge University Press.

<sup>8</sup> VAN DE NOORT, R. 2011. Conceptualising climate change archaeology. *Antiquity* 85: 1039–48. <https://doi.org/10.1017/S0003598X00068472>;

RICK, T.C. & D.H. SANDWEISS. 2020. Archaeology, climate, and global change in the age of humans. *Proceedings of the National Academy of Sciences of the USA* 117: 8250–53. <https://doi.org/10.1073/pnas.2003612117>

<sup>9</sup> SMITH, M.E. 2021. Why archaeology's relevance to global challenges has not been recognised. *Antiquity* 95: 1061–69. <https://doi.org/10.15184/aqy.2021.42>

<sup>10</sup> DAHLSTROM, M.F. 2014. Using narratives and storytelling to communicate science with nonexpert audiences. *Proceedings of the National Academy of Sciences of the USA* 111: 13614–20. <https://doi.org/10.1073/pnas.1320645111>

shift their focus from artefacts to ecofacts and ‘hyperfacts’, using, for example, Geiger counters to detect anthropogenic radiation. Archaeology, he concludes, will change radically in the Anthropocene, expanding to examine the sum of human residue and its persistence on Earth—and beyond. Indeed, Campbell is not the only contributor in the current issue to discuss the archaeological record above rather than below us.

## Space cowboys

🏠 During the summer, as COVID-19 continued its grim progress around the world, and the consequences of climate change played out in real time, a select club of billionaires competed to see who could be the first to escape into space. For most of the history of space exploration, competing nation states rather than individuals and companies have driven forward technological developments in the space race. But space exploration has also provided remarkable potential for collaboration—the most obvious example being the International Space Station, or ISS. As the largest piece of human material culture in space, the ISS represents a unique assemblage through which to study the social, cultural and technological aspects of space exploration. In low-gravity environments, the possibilities of the human body and its interactions with material culture all change. In this issue, Walsh and Gorman introduce the ISS Archaeological Project, an initiative to collate and analyse NASA archives and material culture associated with the ISS. Here, the authors focus on the corpus of photographs taken by the international crew, amounting to millions of images documenting human life in space. Alongside the study of other material culture associated with the ISS, the authors aim to illuminate the social and geopolitical intersections of identity with the material and embodied experiences of living in space.

## New World Heritage Sites

🏠 The 44<sup>th</sup> meeting of the UNESCO World Heritage Committee, hosted in Fuzhou, China, was held in July. As the 2020 meeting was postponed due to the COVID-19 pandemic, the virtual gathering had two years’ worth of business to consider. The de-listing of ‘Liverpool-Maritime Mercantile City’—only the third World Heritage Site to be removed from the list—attracted much attention. The decision came after years of warnings from UNESCO about the impact on the architectural integrity of the site resulting from major developments on the city’s waterfront. Few, therefore, were surprised by the announcement; ultimately, however, the real significance of the decision may relate not to Liverpool, but to its implications for another well-known UK World Heritage Site (see below).

In terms of newly inscribed properties, the Fuzhou meeting added a bumper 29 cultural sites to the list. These include Peru’s Chankillo complex, a late third-century BC solar observatory, and Chile’s Chinchorro Culture, with its early evidence for artificial human mummification. In Africa, a group of mosques in Côte d’Ivoire have been inscribed as examples of a local architectural style that developed in the context of the Mali Empire and trans-Saharan trade that brought Islam to this part of West Africa. Newly inscribed properties in Europe include the transnational ‘Frontiers of the Roman Empire—The Lower German Limes’, incorporating sites in Germany and the Netherlands, and Romania’s ‘Roşia Montană Mining Landscape’, which features a largely inaccessible underground Roman gold-mining complex.

The ‘Petroglyphs of Lake Onega and the White Sea’, is another European addition, recognising Neolithic rock art sites in Karelia. Rock art also forms the basis of the inscription of the ‘Ḥimā Cultural Area’ in Saudi Arabia, which features petroglyphs spanning over 7000 years as well as well-preserved rock-cut inscriptions. Other newly listed sites highlight the full gamut of human settlement forms, including: the ‘Jōmon Prehistoric Sites in Northern Japan’ as examples of hunter-gatherer sedentism; the ‘Arslantepe Mound’ in Turkey, a tell site occupied for six millennia, with evidence of early social and bureaucratic complexity; and the Harappan city of Dholavira in Gujarat, recognised for its advanced water management system.

Located around 200km along the coast from Fuzhou (the host city of the virtual meeting) is another newly inscribed site: ‘Quanzhou: Emporium of the World in Song-Yuan China’. The site is recognised as an emporium of the Song and Yuan periods of the tenth to fourteenth centuries AD. A key node in the Maritime Silk Road, the site was both a point of transit as well as manufacture, with evidence for iron and ceramic production surrounding the central complex of offices, temples and tombs. But where were these goods destined to end up? Examining the other end of this transcontinental exchange network—in the far Western Mediterranean—the article by Gutierrez *et al.* in the current issue examines some of the earliest Chinese exports to the West. The appearance of Chinese porcelain and celadon in Europe has long been dated to the thirteenth century AD. The authors, however, present a unique group of Chinese ceramic sherds from ninth- and eleventh-century archaeological contexts in Spain. The presence of these desirable ceramics on high-status sites 10 000km from their place of production points to small-scale gift-giving rather than regular commerce. Nonetheless, these vessels helped to lay the groundwork for the much larger-scale importation of Chinese goods that would follow through the second—and early third—millennium AD.

## Updates

Recent editorials have covered several fast-moving developments and a few updates are now in order. The August editorial brought news of the plan to close the Archaeology Department at the University of Sheffield. Depressingly, the closure has since been confirmed. The exact plans to redistribute some staff and specialisms across other departments, however, remain unclear. Meanwhile, nearby Hull University has confirmed the withdrawal of its undergraduate archaeology provision and the department at the University of Worcester is now under threat of closure. In more positive news, the UK government appears to have recognised the contradiction of adding archaeologists to its list of skilled worker shortages, whilst simultaneously cutting university funding for training archaeology students. The Department for Education is still pressing ahead with cuts to so-called ‘high-cost, non-strategic’ subjects, including music and media studies, but has now removed archaeology from the list.

Looking back further, the February editorial reviewed recent developments in the saga of the Stonehenge tunnel—the plan to relieve traffic congestion through the World Heritage Site by widening the A303 road, burying the 2.9km-long section close to Stonehenge in a tunnel (Figure 2). Acting against the advice of a string of independent reviews—including a report by UNESCO—the UK Secretary of State for Transport gave the go-ahead for the scheme in late 2020. Subsequent legal action brought by the Save Stonehenge World



*Figure 2. A view of traffic on the A303 road, looking west from the Bronze Age round barrow cemetery on King Barrow ridge, August 2021. Stonehenge lies approximately 200m to the right side of the road (photograph by R. Witcher).*

Heritage Site group made its way to the High Court, which, in July, effectively quashed the planning approval by ruling the Secretary of State's decision to be unlawful. The government will now need to reconsider the impact of the road scheme on the archaeology and consider alternative, less damaging options to the wider Stonehenge landscape.<sup>11</sup>

<sup>11</sup> Available at: <https://infrastructure.planninginspectorate.gov.uk/projects/south-west/a303-stonehenge> (accessed 19 August 2021).

At the time of writing (mid-August), the government's intentions remain unknown. A solution to the problem of traffic congestion on the A303 at Stonehenge has never been straightforward and consequently the situation has rumbled on for decades. Time, however, only makes the situation worse and the decision harder—the volume of traffic continues to grow, as does the size of the local population, with a large increase in the military garrisons on the nearby Salisbury training area (see [Frontispiece 1](#)). 2021 is shaping up as a particularly tough year to lance the boil. First, the government needs to reconcile a multi-billion pound road-building programme with an ambitious climate change strategy whilst in the international spotlight of COP26. Second, UNESCO's decision to remove Liverpool from the World Heritage Site list suggests that the organisation could be serious about following through on its warnings. Indeed, virtual delegates at the Fuzhou meeting recommended that, unless the plans are modified, the Stonehenge site should be placed on the list of endangered properties in 2022.<sup>12</sup>

The UK government shrugged off the de-listing of Liverpool with an assertion of world-leading heritage protection measures,<sup>13</sup> but the loss of World Heritage status for Stonehenge would be less easy to dismiss. In response to the Liverpool decision, a recurrent theme of TV news vox pops was “I never knew Liverpool *was* a World Heritage Site!”. The same response would not be true for Stonehenge. The site is among the most instantly recognisable of the 1000+ sites on UNESCO's list. Would the UK government be prepared to brazen out the international opprobrium? Time will tell, but if history is anything to go by, it will not tell us soon.

## Peer Review Week

It is a pleasure to take the opportunity provided by this year's international Peer Review Week—20–24 September—to express our thanks to the many peer reviewers who have given their time and expertise to comment on manuscripts over the past 12 months. Every year, we invite hundreds of colleagues from around the world to evaluate submissions, providing essential independent feedback for authors and specialist guidance for the editorial team.

Peer review sometimes comes in for criticism; peer reviewers rarely receive recognition for their efforts and authors occasionally question Reviewer 2's motivations. The practice, however, is not fixed in stone and undergoes continual development. Reviewers, for example, can now claim credit for their efforts through services such as Publons ([www.publons.com](http://www.publons.com)). Similarly, the traditional model of single-blind, or single-anonymised, review, whereby the identities of the reviewers are withheld from the author(s), is giving way to a range of different formats. These include double- and triple-anonymised review, open review and even post-publication review, each with its own strengths and weaknesses. Over the past few years, peer review of *Antiquity* content has also evolved. We have introduced peer review of Project Gallery articles, both to help support authors to strengthen their contributions (and their careers—peer review being an essential criterion for progression), as well as to help the

<sup>12</sup> Available at: <https://whc.unesco.org/en/list/373> (accessed 19 August 2021).

<sup>13</sup> Available at: <https://www.theguardian.com/uk-news/2021/jul/23/stonehenge-may-be-next-uk-site-to-lose-world-heritage-status> (accessed 19 August 2021).

editorial team to select from the many submissions we receive. From January this year, as part of a wider commitment to equitable and inclusive practice, *Antiquity* has also moved from single- to double-anonymised peer review. This format means that the identities of both the authors and reviewers are withheld in order to minimise any bias—conscious or otherwise—in the evaluation of research. In fact, Peer Review Week 2021 was dedicated precisely to the theme of identity in peer review, examining the ways in which personal and social identities can affect the practice and experience of peer review. As we accumulate data over the coming year, we will assess if and how our change to double-anonymised review has affected reviewer comments and recommendations, author experience and the editorial decisions that we reach. Meanwhile, we are always looking to expand our pool of peer reviewers. If you would like to be added to our database, do please get in touch via [assistant@antiquity.ac.uk](mailto:assistant@antiquity.ac.uk). Be assured, your peer review services will be greatly valued!

## In this issue

 As ever, the current issue presents articles covering a wide variety of periods, regions, themes and approaches. Several articles redirect our attention to well-known case studies, using recent finds and novel analyses to shed new light on the familiar. Rast-Eicher *et al.* return to the debate about early thread- and textile-making technologies at Çatalhöyük. Rather than flax or wool, as previously believed, their new analysis demonstrates that the inhabitants of the East Mound during the seventh millennium BC made use of oak bast, or tree fibres, to manufacture textiles. This use of locally available tree bast raises questions about the historical development of thread- and textile-making technologies elsewhere in prehistoric Europe and South-west Asia. In a similar vein, Nielsen *et al.* present a new study of the gut contents of the Early Iron Age bog body known as Tollund Man. Using a suite of techniques, the team assesses plant macrofossils, pollen, steroid markers and proteins to identify Tollund Man's final meal in new detail. The barley-based meal was supplemented with flax and pale persicaria seeds; the authors argue that the abundance of the latter is the result of the addition of threshing waste to the meal, although for what purpose is uncertain. By coincidence, both the Çatalhöyük and Tollund Man articles reassess studies undertaken in the 1950s and 1960s by the Danish archaeologist Hans Helbæk; they demonstrate both the value of applying new techniques to old questions and the need to use finite remains with care to ensure their availability for future analyses.

Burger *et al.* investigate another well-known site: Machu Picchu. Using new AMS-radiocarbon dating of samples of bone and teeth from individuals buried in caves around Machu Picchu, the authors demonstrate that the site was occupied some two decades earlier than suggested by the conventional text-based chronology. Moving back the date of a site by 20 years is rarely of great significance for our wider understanding. At Machu Picchu, however, redating the construction of the site to *c.* AD 1420 places it firmly before the rise to power of the emperor Pachacuti in 1438, and hence calls into question the wider basis of the conventional Inca chronology.

Two articles in this issue focus on water buffalo and the translocation of this species to new environments in the Caucasus and Australia. Wordsworth *et al.* use ZooMS and zooarchaeological methods on material from Azerbaijan to examine the introduction of the water buffalo

into the Caucasus as part of the expansion of the Umayyad and Abbasid Caliphates. The authors document how these centralised powers used the introduction of the species into new territories to control and exploit marginal ecological zones. Meanwhile, May *et al.* explore how the arrival of water buffalo among the Aboriginal societies of western Arnhem Land during the colonial contact period was mediated through rock art. Using ethnographic accounts to interpret depictions of water buffalo, the authors show how these animals were conceptualised, not as newly arrived and hence a challenge to the existing world-view, but rather, as re-emergent and therefore already ontologically established.

In addition, we also feature a Bronze Age mint in China, the soundscape of an Etruscan tomb, isotopic analysis of diet in the ancient Andes and an archaeological study of slavery in early modern Malta. We also have a new set of Project Gallery articles available online, featuring research on Finland, Poland and Uzbekistan, as well as our reviews section.

Whether revisiting the archaeology of familiar sites or thinking about the unfamiliar forms of archaeology in space and in the far future, we hope you will find much of interest in the current issue.

ROBERT WITCHER  
Durham, 1 October 2021