

Frontispiece 1: The 'Archaeology and Gender in Europe' (AGE) community of the European Association of Archaeologists aims to stimulate non-essentialist interpretations of the past and to promote diversity and inclusivity among practitioners of archaeology. This illustration, by Nikola Radosavljević, is featured in a new book by AGE members, Gender stereotypes in archaeology: a short reflection in image and text, which is intended to challenge uncritical sex/gender stereotypes in archaeological practice, academic texts and museum exhibitions. The volume combines striking images and short, sharp texts to address 24 stereotypes. This illustration accompanies a text by Sandra Montón Subías deconstructing the stereotype that "Binary sex and gender systems are natural" (reference: L. Coltofean-Arizancu, B. Gaydarska & U. Matic (ed.). 2021. Gender stereotypes in archaeology: a short reflection in image and text (illustrations by N. Radosavljević). Leiden: Sidestone. Available Open Access: <https://www.sidestone.com/books/gender-stereotypes-in-archaeology>).



Frontispiece 2: A reconstruction of the face of a Neanderthal—nicknamed ‘Krijn’—for the 2021 exhibition ‘Doggerland’ at the Rijksmuseum van Oudheden (National Museum of Antiquities) in Leiden, the Netherlands. In 2009, a cranial fragment was dredged from the bed of the North Sea off the Dutch coast. Research by Leiden University and the Max Planck Institute in Leipzig identified the bone as that of a young male Neanderthal, dating to 50 000–70 000 years ago. A small hole just above the pronounced right brow ridge was caused by a benign tumour, the first to be identified in a Neanderthal. The individual’s face was reconstructed for the exhibition by the ‘palaeo-artists’, the Kennis brothers, and features a conspicuous lump over his right eyebrow (photograph © Rijksmuseum van Oudheden).

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EDITORIAL

Carbon captured

Time and energy are in short supply. The recent COP26 summit stressed that we are running out of time to cut carbon emissions and avert catastrophic climate change; concurrently, the spiralling cost of fossil fuels signals that demand for energy is far outstripping supply. As the world economy emerges from COVID-induced recession, we have re-embraced our old carbon-based energy habit with gusto. Pre-pandemic, in 2019, the average US citizen used ~220kWh per day,¹ the equivalent energy to that of a personal army of several hundred labourers. So accustomed have we become to the consumption of such vast amounts of energy that we barely register its profound effects on perceptions of ourselves and of the world around us. Yet, our notions of distance, darkness, work, wealth, health, risk and time are now fundamentally different from those of the pre-modern world, so much so that it seems impossible to imagine the human experience of only a few hundred years ago.

Historically, of course, such energy consumption is unprecedented. Until as recently as a couple of centuries ago, nearly all of humanity's energy needs were met by what today we would label as 'renewable sources': firewood, animals for traction and transport (see Taylor *et al.* this issue), watermills, windmills and human labour—both free and unfree. The scale of pre-industrial energy usage was not static, however; studies of human societies over the *longue durée* have observed a causal relationship between growing organisational capacity, or complexity, and greater energy capture.² Nor is the human exploitation of fossil carbon a modern invention; it long pre-dates the start of deep coal mining in late eighteenth-century Britain, or the first oil well drilled at Titusville in Pennsylvania in 1859. Humans have exploited the varied and useful properties of fossil carbon for tens of thousands of years. Levallois artefacts dating to 70 000 BP from Umm el Tlel in Syria, for example, were hafted using bitumen extracted from the tar sands of Djebel Bichri.³ The use of fossil carbon specifically as a source of energy came much later. In northern China, for example, coal was used for smelting during the Bronze Age,⁴ and its presence in small quantities on Romano-British sites suggests wide if low-level use across Rome's most northerly province.⁵ More intensive and widespread exploitation of fossil fuels, however, was restricted by the costs of extracting

¹ RITCHIE, H. & M. ROSER. 2020. Energy. Available at: <https://ourworldindata.org/energy> (accessed 19 October 2021).

² MORRIS, I. 2010. *Why the West rules for now*. London: Profile.

³ BOËDA, E. *et al.* 2008. Middle Palaeolithic bitumen use at Umm el Tlel around 70 000 BP. *Antiquity* 82: 853–61. <https://doi.org/10.1017/S0003598X00097623>


⁴ DODSON, J. *et al.* 2014. Use of coal in the Bronze Age in China. *The Holocene* 24: 525–30. <https://doi.org/10.1177/0959683614523155>

⁵ DEARNE, M.J. & K. BRANIGAN. 1995. The use of coal in Roman Britain. *The Antiquaries Journal* 75: 71–105. <https://doi.org/10.1017/S000358150007298X>

and transporting these geographically localised substances, especially when other more accessible sources of energy, such as wood, olive pressings, animal dung, or wind and water power, were readily available. Often, the exploitation of new forms of energy was—and still is—inhibited by significant social and economic costs, whether the need to build new infrastructure or change established ways of preparing food, heating houses, crafting objects or travelling. But the sources of energy also matter; aggregating small amounts of energy from renewable sources requires a very different form of social organisation to that needed when energy-dense fossil fuels are available.⁶

Once the uptake costs of exploiting fossil fuels were overcome, however, the vast amounts of energy unleashed have driven 200 years of extraordinary innovation and growth—as well as unprecedented socio-economic inequality and ecological disaster. Industrial archaeologists have long studied the factories, transport infrastructure and material culture of the eighteenth and nineteenth centuries, illuminating the origins of the fossil fuel-based world of today.⁷ Contemporary archaeologists are now tracing the effects of present-day extractive and industrial processes, such as how global capital creates distinctive types of settlement and notions of domesticity.⁸ Although there is nothing historically comparable to the scale, speed and comprehensiveness of the energy revolution that will be required to achieve carbon net zero within the next few decades, archaeology nonetheless has a role to play in the decarbonisation of the contemporary world. We can offer historical perspective on the capture and consumption of energy, on the social and economic conditions that impede or promote the adoption of new forms of energy capture, and on the ways in which industrialisation and globalism reshape individuals, communities and the environment. This will require considerable new research and, of no less importance, collaboration with other specialists, and communication with policy-makers and the public. The recently published ‘Kiel Statement on Archaeology and Climate Change’, approved at this year’s annual meeting of the European Association of Archaeologists, points firmly in this direction. It also recognises that, as archaeologists, we need to decarbonise our discipline as well, so that our fieldwork and professional practice become part of the solution, rather than part of the problem.⁹

Boats and bytes

 The world’s current energy crisis intersects with problems of global connectivity. During 2020, lockdowns and recession led to a sharp fall in production and left cargo ships and millions of shipping containers stranded in the wrong place. The faster-than-expected revival of consumer demand has consequently led to a multitude of issues, as long supply chains, fewer

⁶ TAINTER, J.A. & T.F.G. ALLEN. 2019. Energy gain and the evolution of organization, in C. Isendahl & D. Stump (ed.) *The Oxford handbook of historical ecology and applied archaeology*: 558–77. Oxford: Oxford University Press.

⁷ Most recently, FENNELL, C. 2021. *The archaeology of craft and industry*. Gainesville: University Press of Florida. <https://doi.org/10.2307/j.ctv1w36p7n>

⁸ E.g. CARAHER, W.R., B. WEBER, K. KOURELIS & R. ROTHAS. 2017. The North Dakota Man Camp Project: the archaeology of home in the Bakken oil fields. *Historical Archaeology* 51: 267–87. <https://doi.org/10.1007/s41636-017-0020-8>

⁹ 2021 Kiel Statement on Archaeology and Climate Change. Available at: <https://www.e-a-a.org/2021Statement> (accessed 19 October 2021).

but larger container ships and just-in-time delivery systems leave little margin for disruption. Indeed, current events are leading some nations to reassess their vulnerability to the vicissitudes of the global economy, looking instead to repatriate production and to shorten the distance between producers and consumers.

Over the past 20 years, archaeological studies of connectivity and pre-modern globalisations have proliferated, reflecting the organisation and preoccupations of the contemporary world. Projects such as the Belt and Road initiative, which is developing land and sea routes between China and Western Asia, Africa and Europe, are echoed in the renewed attention to the archaeology of the Silk Roads through Central Asia and maritime connections between East and West.¹⁰ Intentionally or otherwise, such studies have tended to emphasise the ‘successes’ of this connectivity: the scale and volume of ancient exchange networks and the social organisation and technological developments needed to sustain them. Ironically, some of the best archaeological evidence for such networks relates to those moments when connectivity goes wrong: shipwrecks. Yet, these individual disasters are typically deemed the unfortunate exceptions that permit us to construct broader economic narratives with a lingering sense that bigger is better: larger cargoes, lower-value goods, longer distances. In this view, the greatest challenges to ancient trade were the friction of distance, bad weather and piracy. But might the glimmers of a reorganisation of the contemporary global economy shift our archaeological perspective, with less emphasis on the scale and volume of exchange, and more on the interdependencies to which the participating societies were exposed? Such issues are certainly not a uniquely modern phenomenon; Tacitus (*Historiae* 4.38), for example, noted that mere rumours of civil war disrupting the supply of African grain were sufficient to cause price rises and anxiety in ancient Rome. Similarly, disruption to the long-distance supply of even small volumes of high-value goods, such as amber, obsidian or metals, could destabilise societies whose social structures had come to depend on such imports. As the turbulence of the contemporary global economy has made clear, the production, exchange and consumption of goods ties us together in ways that are often difficult to discern—until they start to unravel.

No less than for commodities, networks for the exchange of information were also as vital in the past as they are today. Recently, we have been reminded yet again of the fragility of our ever-more integrated communications systems, with a few lines of erroneous code knocking Facebook, Instagram and WhatsApp offline. The massive volumes of interaction facilitated by these platforms is historically unprecedented; a world where an ill-advised late-night tweet can have been seen and commented on millions of times by the following morning bears no resemblance to communication in the past (i.e. before about a decade ago!). We might well ponder how differently ancient emperors would have governed with access to the reach and impact of Twitter; the audience for a monumental building project or a lavish mausoleum pales in comparison to that of a celebrity influencer’s tweet. Yet, the longevity of the average social media post is measured in minutes not millennia; a TikTok video does not

¹⁰ E.g. GUTIÉRREZ, A., C. GERRARD, R. ZHANG & W. GUANGYAO. 2021. The earliest Chinese ceramics in Europe? *Antiquity* 95: 1213–30. <https://doi.org/10.15184/aqy.2021.95>.

Brite, E.B. *et al.* 2021. Abu Muslim qala: an iron-production site along Central Asia’s medieval north-south trade routes. *Antiquity* Project Gallery 95: e27. <https://doi.org/10.15184/aqy.2021.65>.

provide the massive materiality of a temple or mausoleum through which to carry meanings into the future past. Still, tweets and Facebook posts have real-world impacts in the present: the food we eat, the clothes we wear and the places we visit. Our virtual habits also contribute to the climate crisis; astonishingly, for example, in the USA, several coal- and gas-fired power stations have been repurposed solely to generate electricity for the mining of cryptocurrencies.

Are tweets and bitcoins the stuff of archaeology? The question relates to long-running debates about how we define the discipline of archaeology: is it the study of the past, the present or the future?¹¹ Or is it characterised by a set of distinctive methods? Archaeology is often defined as the study of material culture—a definition that would firmly rule out the virtual world. In this issue, John Aycock initiates a debate around the ‘coming tsunami of digital artefacts’, arguing that if the aim of archaeologists is to understand human culture, we need to direct our attention to the burgeoning quantities of digital artefacts that are produced every minute, and which increasingly shape all aspects of our contemporary lives. As a computer scientist observing the interests and practices of archaeologists, Aycock notes a growing mismatch between the focus of archaeological endeavour and the quantity of digital data accumulating around us. This does not, however, render archaeology irrelevant, as Aycock argues that our discipline already has a suite of theories and methods through which to incorporate the study of the virtual. In response, we have invited several archaeologists who deal with digital data and the virtual world to comment. Kansa & Kansa, for example, argue that there is still much work to be done to improve the digital literacy of archaeologists if we are to understand the creation, use and reuse of our own digital products. Colleen Morgan emphasises the blurring of the physical and the virtual, setting the archaeological study of the digital within a broader political context; and Jeremy Huggett explores how we might lay claim to a distinctly archaeological perspective on the digital and on human-digital relations.

Imperial entanglements

🗨️ 2021 marks the 500th anniversary of the fall of the Aztec capital Tenochtitlán to the Spanish conquistadors in 1521. The date was marked this summer in Mexico City—the modern incarnation of Tenochtitlán—with an audio-visual spectacular in the city’s main piazza, the Zócalo. The location coincides with the site of the Templo Mayor, the principal temple of the Mexica people. The scene of great bloodshed during the Spanish conquest, the temple was subsequently levelled by the Europeans to make way for the present-day cathedral. During August and September 2021, the ‘Memoria Luminosa’ show temporarily resurrected the Templo Mayor with a one-third size replica forming a 3D canvas on which to project scenes from the city’s past (Figure 1).¹² Alongside the anniversary of the fall of Tenochtitlán, this year also marked the bicentenary of Mexican independence, focusing renewed attention on the legacy of the Spanish era—a heritage that remains contentious both within and

¹¹ E.g. CAMPBELL, P.B. 2021. The Anthropocene, hyperobjects and the archaeology of the future past. *Antiquity* 95: 1315–30. <https://doi.org/10.15184/aqy.2021.116>

NATIV, A. & G. LUCAS. 2020. Archaeology without antiquity. *Antiquity* 94: 852–63. <https://doi.org/10.15184/aqy.2020.90>

¹² ‘Memoria Luminosa’. Available at: <https://www.youtube.com/watch?v=DzVKslKqzKQ&t=326s> (accessed 19 October 2021).



Figure 1. The Aztec god, Tlāloc, projected onto a temporary replica of the Templo Mayor in the Zócalo, Mexico City. The 'Memoria Luminosa' audio-visual experience, August–September 2021, was organised by Maizz in collaboration with Mexico City's Secretary of Culture. <https://www.maizz.mx> (photograph © Maizz).

beyond Mexico. Marking the bicentenary, Pope Francis spoke of the Catholic Church's role in the "very painful errors committed in the past", amplifying his previous comments about the effects of colonialism on Indigenous peoples in Central and South America. In sharp contrast, some right-wing politicians in Spain have used the anniversary of the conquest of Mexico to talk of the Spanish 'gift of civilisation' to the Americas.¹³ Meanwhile, in Mexico, the role of some Mesoamerican peoples in the Spanish victory over the Aztecs has attracted renewed attention. Siding with Cortés and his 500 soldiers, Tlaxcalans and others played an important part in the defeat of the Aztec Empire, subsequently achieving privileged status within the Spanish regime. With the rise of nationalist sentiment following Mexican independence, however, the actions of Tlaxcalans and others came to be viewed as treacherous. This year's anniversaries have prompted a re-evaluation of these Mesoamerican peoples' motivations, arguing that Tlaxcalans sought an expedient alliance with the Spanish to free themselves from Aztec imperial control, but ultimately they were working towards very different and misaligned objectives to those of the conquistadors.¹⁴

Such debates and re-evaluations highlight the continuing legacy of the Spanish conquest in the present day, as well as reminding us of the long history of pre-Hispanic imperialism in the Americas, such as the expansive polities of the Wari and Inca. Turning to the northern Andes, in this issue, Conlee *et al.* present the results of recent excavations at the site of Huaca del Loro in the Nasca region of southern coastal Peru. The authors argue that the presence of distinctive architecture and artefacts identifies the site as an early Wari colony. Scholars have long debated the nature of relations between the Wari with their neighbours. Here, the authors characterise the Wari as a 'first-generation empire', working without a blueprint to develop strategies for the ideological control and economic exploitation of other Andean populations.

Mexican mirrors

☞ The Spanish conquest of the Americas was driven in no small part by the search for silver and gold, and vast amounts of wealth were subsequently drained from the New World to the Old. But in addition to materials of intrinsic value, Europeans also sought objects deemed to be prestigious, exotic or of mystical fascination. Among these objects were obsidian mirrors from Mesoamerica, which made their way into the possession of aristocrats and antiquarians across Europe. One such collection of mirrors, now held at the British Museum, forms the basis of an article in the current issue. Campbell *et al.* use geochemical analyses to pinpoint the provenance of four such obsidian mirrors, including one long associated with John Dee (1527–1608/9)—antiquarian, astronomer and advisor to Queen Elizabeth I (Figure 2). Although the mirrors were long believed to have originated from Mesoamerica, here, for the first time, the authors are able to confirm a Mexican origin, adding a new chapter to

¹³ JONES, S. & A. GIUFFRIDA. 2021. Madrid leader takes issue with pope's apology for 'painful errors' in Mexico. *The Guardian*, 29 September 2021. Available at: <https://www.theguardian.com/world/2021/sep/29/madrid-leader-takes-issue-with-popes-apology-for-painful-errors-in-mexico> (accessed 19 October 2021).

¹⁴ CARBALLO, D.M. 2021. Native conquistadors: the role of Tlaxcala in the fall of the Aztec Empire. Available at: <https://blog.oup.com/2021/08/native-conquistadors-the-role-of-tlaxcala-in-the-fall-of-the-aztec-empire/> (accessed 19 October 2021).

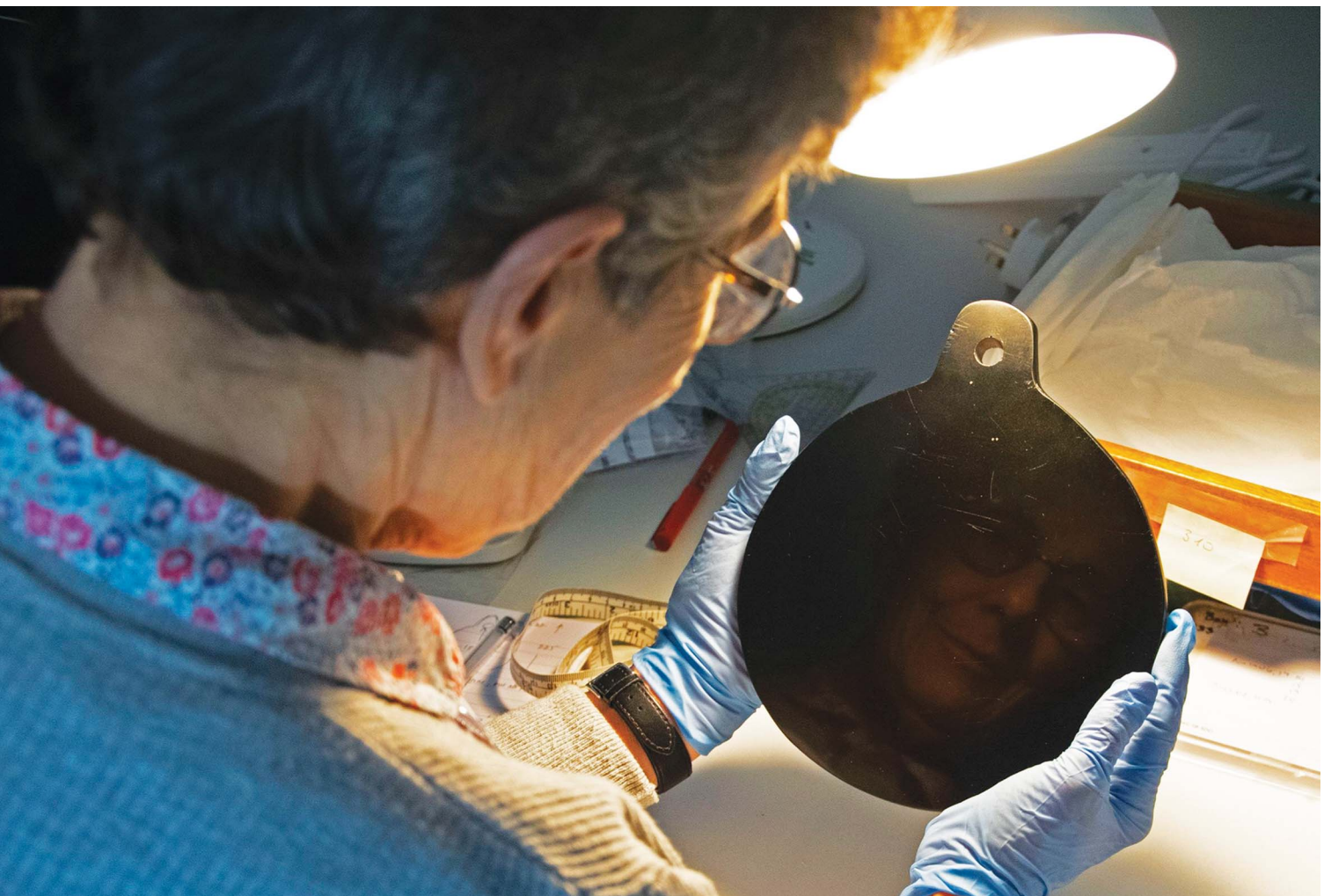


Figure 2. Elizabeth Healey studies the John Dee mirror (photograph © S. Campbell).

the biographies of these objects and, once again, demonstrating the value of fresh investigations of museum collections.

For millennia, around the world, obsidian was a highly sought-after material. It can be fractured or knapped to produce both razor-sharp edges and smooth, lustrous surfaces, making it both functional and alluring. Such properties explain the lengths to which past peoples went to acquire this special substance, whether journeying to volcanic islands or developing long-distance exchange networks.¹⁵ In Mesoamerica, obsidian was long used for the production of tools and various ritual artefacts. It was not until the Postclassic period (first half of the second millennium AD), however, that the reflective properties of obsidian were exploited for the manufacture of mirrors. Previously made of polished jade or pyrites, mirrors were widely depicted in Classic Maya iconography at sites such as Teotihuacan. But it was the Toltecs and Aztecs that combined the allure of obsidian with the symbolism of the mirror to develop a complex cosmology around these objects, implicating them in divine and temporal power. In particular, obsidian mirrors were used for divinatory practices, seeking messages from the gods or visions of the future.

Knowledge about the rich symbolism and complex use of these mirrors was conveyed back to early modern Europe through codices and the writings of the conquistadors, although such information can have been only very partial, at best. John Dee probably acquired the obsidian mirror in his collection ‘second-hand’ via continental Europe, rather than through a direct import to Elizabethan England. Whether he was fully aware of its origins and the use and significance of such objects in Mesoamerica is unclear, but as he was known to use mirrors to attempt to communicate with angels and spirits, any knowledge of the object’s earlier biography can only have enhanced Dee’s perception of its mystical powers.

When not dabbling with the occult, Dee played a significant role in Elizabethan attitudes towards the New World. Indeed, rather than a new continent, he long held the belief that the landmass discovered across the Atlantic was, in fact, Atlantis, and therefore represented a rediscovery of the ‘old world’. Dee’s garbled understanding of the Americas, combining snippets of myth, ethnography and impartial geographic knowledge, subsequently sent Walter Raleigh on his wild goose chase in search of El Dorado (a voyage which would, however, lead Raleigh to Trinidad’s Pitch Lake, the world’s largest deposit of asphalt—another oil derivative to which the world has subsequently become addicted). But Dee was far from a confused antiquarian. He actively promoted England’s imperial expansion in the Americas and is credited with the invention of the term, ‘British Empire’. His encouragement for the exploration and settlement of the New World relied, in part, on an argument of historical precedent. Dee, for example, annotated the reverse of a map that he provided for a 1583 voyage to claim Newfoundland for the English crown, setting out British claims to North America via a genealogy of earlier Atlantic explorations extending back to King Arthur.¹⁶ Perhaps, in a similar vein, when Dee looked into his obsidian mirror, he did not imagine himself to be appropriating

¹⁵ E.g. PITULKO, V.V. *et al.* 2019. ‘They came from the ends of the earth’: long-distance exchange of obsidian in the High Arctic during the Early Holocene. *Antiquity* 93: 28–44. <https://doi.org/10.15184/aqy.2019.2>

¹⁶ SOBECKI, S. 2015. New World discovery, in J. Simpson (ed.) *The Oxford handbook of medieval and Tudor literature*: 1–20. Oxford: Oxford University Press. <https://doi.org/10.1093/oxfordhb/9780199935338.013.141>

new and exotic forms of knowledge from the Americas so much as reforging a connection with Europe's own imagined past.

Also in this issue

Several articles in this December issue explore the social and economic practices of hunter-fisher-gatherer societies. Spataro *et al.* combine multiple methods to examine diet and pottery use among hunter-fisher-gatherers of the eastern Baltic. As far back as the sixth millennium BC, pottery vessels were being used for the preparation of both fish and non-ruminant meat (probably wild boar). Subsequent developments in ceramic technology that might have indicated an associated change in diet or cooking techniques, however, are shown to be independent of the food that these hunter-fisher-gatherers ate and how they prepared it. Hence, while pottery techniques evolved, established dietary and cooking preferences were maintained over millennia. Bennerhag *et al.* shift our attention to metallurgical practices among the hunter-fisher-gatherers of the Circumpolar North. Reporting the results of recent excavations in northern Sweden, the authors demonstrate that iron technology, including steel production and complex smithing techniques, were integral to these subsistence economies by the end of the first millennium BC. Finally, Montt *et al.* report on post-mortem body transformation among the Chinchorro hunter-fisher-gatherers of the Atacama Desert coast. Here, the bodies of the deceased were subject to complex treatments to augment the physical corpse, including stuffing of the head or torso with fibres or animal skins, the application of clay pastes to the face and the addition of wigs made of human hair. The authors approach these manipulations of the deceased as a form of social embodiment intended to maintain corporate Chinchorro identity. Earlier this year, UNESCO acknowledged the wider cultural significance of these funerary practices with the award of World Heritage Site status. The designation of the 'Settlement and Artificial Mummification of the Chinchorro Culture in the Arica and Parinacota Region' recognises these post-mortem treatments as some of the oldest-known artificial mummification practices anywhere in the world, beginning as early as the mid-sixth millennium BC. All three of these articles emphasise the complexity of hunter-fisher-gatherer practices, with traits such as sedentism, metallurgy, pottery production and elaborate funerary rituals more commonly associated with farmers.

Elsewhere in this issue, Armit and Reich explore the archaeological implications of the massive genetic turnover in late third-millennium BC Britain documented by recent aDNA research. The broad chronological coincidence of this genetic change with the arrival of the Beaker complex has given rise to much debate. Here, the authors advance two alternative hypotheses—Beaker Colonisation and Steppe Drift—that capture some of the fundamental differences in how the relationships between objects and genes can be conceptualised. The authors' intention is not to choose between these hypotheses, but rather, to identify the additional evidence we need in order to evaluate them, for example, by targeting sites dating to *c.* 2600–2000 BC. That both the cultural identity and genetic make-up of Britain changed significantly in the third millennium BC is no longer in doubt. Armit and Reich argue that the challenge now is to encourage the dialogue needed to integrate the archaeological and genetic data with nuance and rigour.

Other articles featured in this issue include analyses of Palaeolithic cave art in Italy, the Mesolithic–Neolithic transition in the Nile Valley of Central Sudan, early Phoenician settlement in Iberia, and the ongoing and complex legacy of the First World War in Poland. We also have six new Project Gallery articles reporting on research in Guatemala, the Philippines, Poland, Sudan, the USA and Zimbabwe. If you are working on innovative new research on any aspect of archaeology, from the earliest hominins to the latest technology, why not make 2022 the year to join our global community of contributors? You can consult *Antiquity*'s submission guidelines and policies at: <http://antiquity.ac.uk/submit-paper>. We welcome informal enquiries about potential submissions, and we are happy to answer any questions about the publication process: all of our contact details can be found at: <https://www.antiquity.ac.uk/contact>.

Finally, my thanks to the many authors, reviewers and innumerable others who have supported *Antiquity* through another extraordinary 12 months. I wish you all a peaceful, prosperous and, above all, healthy 2022!

ROBERT WITCHER
Durham, 1 December 2021