FINCUS

۲

Family ties

Deciphering the DNA of the Amesbury Archer and the Companion



Twenty years ago, one of the richest Bell Beaker burials ever found in Europe was discovered close to Stonehenge. At that time, DNA analysis was not sufficiently advanced to learn more about the individual, dubbed 'the Amesbury Archer' – but the intervening decades have seen significant scientific advances that have shed illuminating light on this enigmatic figure, as well as his relationship to a younger man buried nearby. Andrew Fitzpatrick, Jacqueline McKinley, Alistair Barclay, Ian Armit, Iñigo Olalde, and David Reich report on what has been revealed.

ince the discovery of his 4,600-year-old grave by Wessex Archaeology in 2002, the Amesbury Archer has become one of the mostcelebrated individuals in European prehistory. Buried around three miles from Stonehenge in the 24th century BC, he was accompanied by one of, if not the, largest and most-diverse collections of grave goods of any Bell Beaker burial in Europe (see *CA* 184 and 265). Burials like these represent

PHOTO: Elaine A Wakefield, © Wessex Archaeology

50 CurrentArchaeology

MARCH 2022

۲



۲



Amesbury Archer depicts him with many of the objects found in his grave, which included arrows, gold ornaments, knives, and wristguards.

part of a Copper Age and early Bronze Age cultural phenomenon (named after the characteristic bell-shaped 'Beaker' pots often accompanying the dead) that arrived in Britain from the Continent c.2450 BC. Examples have been excavated at sites across the Isles, but the Amesbury Archer stands out for the exceptional array of objects placed in his grave. The almost 100 artefacts included numerous finely worked flint tools, three copper knives, five Beaker pots, and boar tusks, as well as the archery-related accoutrements such as barbed and tanged arrowheads and stone wristguards that sparked the man's modern nickname.

Other clues to his status came from the basket-shaped gold ornaments – possibly earrings or, more likely, worn in his hair, and representing the oldest securely dated gold objects ever found in Britain – as well as a 'cushion stone'. This last object, used as an anvil in metalworking, is particularly significant. Metalworking was exciting new technology that came to Britain as part of the Beaker network, and it is possible that the new knowledge brought by the Amesbury Archer – the earliest metalworker identified in Britain to-date – would have appeared almost magical to his contemporaries, who had never seen metals before.

ANALYSING THE ARCHER

The Archer's skeleton – lying in a crouched position on his left side with his face to the north – survived intact, and analysis of his bones revealed that he had been around 35-45 years old at the time of his death. It was also possible to establish that he had suffered a traumatic and disabling injury to his left knee that would have caused him to walk with a pronounced limp (CA 251). Oxygen isotope evidence, meanwhile, pointed to him having spent his childhood in Central Europe, making the Archer one of the earliest Bell Beaker migrants from the Continent yet identified in Britain. At the time the excavation report was being prepared, however, analysis of his DNA was not viable although in the report it was remarked optimistically that 'advances in ancient DNA analyses make it probable that successful studies could well be undertaken in the future'.

Sure enough, within only a few years step-changes in Next-Generation Sequencing technology made a first attempt possible, only for it to be stymied by the poor preservation of the Archer's DNA. As a result, he could not be included in a ground-breaking study, undertaken by the Harvard laboratory and published in 2018, of the genetic ancestry of Bell Beaker groups. This analysis revealed the astonishing impact of the Bell Beaker phenomenon on Copper Age and Bronze Age Britain: this period did not only herald new ideas and technology, but eventually a genetic turnover on a scale that suggested widespread population replacement (CA 338). While the Archer could not be included in this investigation, the remains of a younger (20- to 25-year-old) man known as 'the Companion', who was buried just a few feet away, were. Bayesian statistical modelling of radiocarbon dates from their skeletons and the boar tusks included as grave goods indicate that both men were buried in the 24th century BC, although probably one or more generations apart.

Intriguingly, that was not all the pair had in common: although the Companion's grave goods were far more modest than those of the Archer, they included the same distinctive gold ornaments and a boar's tusk. Both men also shared an unusual physical trait: their heel bones (the calcanei) and one of the bones with **→**

BELOW Gold basket-shaped ornaments, probably worn on locks of hair, were found in the graves of the Archer and the Companion (the two examples here, tucked inside each other, were found with the latter). Might these, together with skeletal similarities and the proximity of their graves, hint at a familial relationship? DNA analysis held the key.



۲

which they articulated on the top of the foot (the navicular) had been joined by fibrous tissue, which would have limited the motion in their feet. This condition, known as a tarsal coalition, is recorded in only 1-3 per cent of medieval and modern populations in Europe, and it is often inherited over several generations. Taking into account this and other similarities in their skeletons, the closeness of their burials, and the similarities of certain grave goods, it seemed highly likely that the two men were genetically related. Tantalisingly, though, at this stage that could not be proven.

THEORIES OF RELATIVES

۲

A second chance came more recently, when the Salisbury & South Wiltshire Museum (where the Amesbury Archer's remains and grave goods are displayed) identified another opportunity for DNA analysis. The laboratory again made strenuous efforts and this time their persistence was rewarded. A total of 13 ancient DNA 'libraries' were generated on two different tooth samples for the Archer, and six generated on two different tooth samples for the Companion. The full details of the Archer's DNA are included as supplementary data in a paper on genetic change in Late Bronze Age Britain that has just been published in Nature (see this month's 'Science Notes' on p.12, and 'Further reading' below). They show that the Archer's paternal-line ancestry is ultimately derived from Steppe pastoralists, as his Y-chromosome haplogroup is R1b1a1b1a1a (R-L151). This is the most-common haplotype in Bell Beaker males across temperate Europe, and it was introduced to Britain by migrants such as the Archer. Within 400 years, it had become the mostcommon male haplotype in Britain. The Companion's DNA haplotype belongs to R-L151 too, though in his



52 CurrentArchaeology

MARCH 2022



but more-distant relationships starting

from the third degree (for example,

cousins or great-grandfather-great-

grandson) are possible - though it

is, of course, also possible that there

was no close genetic relationship.

When their different ages at death are

taken into account, the radiocarbon

determinations appear compatible

with a great-grandfather and great-

grandson relationship, with a

measured probability using the

OxCal programme that the

Archer died up to 80 years before the Companion. The caveats must

be added that there is considerable

potential overlap in the dates, though,

PHOTO: Kayana Szymczak case it could be further classified as **ABOVE** Processing extracted DNA. R1b1a1b1a1a2c1 (R-L21). Now that and other biological relationships the DNA of both men has been analysed, it is possible to return to the cannot be excluded. question of whether the two shared If the two men were indeed related, family ties as well as burial locations, they were born in very different skeletal traits, and grave goods. places. As mentioned above, oxygen Although the DNA of both the isotope analysis of two of the Archer's Archer and the Companion is poorly teeth indicated that he was a firstpreserved, it was possible to reach generation immigrant born far from a modest data overlap between the Wessex. The teeth chosen for analysis two men: ~14k genomic positions. (his second premolar and third molar) This is enough to rule out first-degree held crucially different information: (father-son; brothers) and secondpremolars mineralise, and therefore degree (half-brothers; uncle-nephew; close isotopically, between three and grandfather-grandson) relationships, six years of age, whereas the third

molars are the last teeth to erupt and probably mineralise between nine and 13 years of age. That is, the premolars form in early childhood and the third molars form several years later, perhaps as late as early adolescence, so the chemical signatures preserved in each (derived from the climate and geology that the person lived in at the time) can provide evidence of where an individual spent different parts of their childhood. Both of the Archer's teeth yielded the same result, showing that he grew up in continental Europe, and the best correlation between the isotope results and the archaeological evidence is in the regions around the

21/01/2022 17:32



ABOVE Boar tusks that were buried with Amesbury Archer. These grave goods not only provided vital radiocarbon dating evidence and another artefactual link with the Companion, but – following recent research in the Czech Republic – might also offer further hints of both individuals having been involved in metalworking.

۲

western Alps – see Fitzpatrick (2011) in 'Further reading' for more on this.

While the Amesbury Archer has Steppe-related ancestry, in comparison to other individuals in Britain that share the same haplotype from this period, it comprises a relatively low proportion of his ancestry, while his proportion of 'Early European Farmer' or 'Neolithic' ancestry is relatively high. Indeed, he stands out as a genetic outlier among Bell Beaker burials in Britain but, intriguingly, high levels of Neolithic ancestry have also been noted in Bell Beaker burials in different regions of eastern France, such as at Hégenheim, Haut-Rhin (close to Basle across the Swiss border), and further south at La Fare in the Alpesde-Haute-Provence - see Olalde et al.

(2018) in 'Further reading'. The fact that the Archer had less Steppe-related ancestry than average in this period means that the migrants who brought Steppe-ancestry to Britain within approximately a century of when he lived must have typically had even more Steppe-related ancestry for this haplogroup to have become dominant. Thus, from the perspective of genetic ancestry of these Bell Beaker immigrants, the Archer cannot have been a typical representative.

In contrast, the Companion's Steppe-related ancestry is typical of his generation in Britain, and the isotope results from his second premolar are consistent with him having been born in Wessex. However, the results from his third molar are very different, suggesting that when he was aged *c*.9-13 he was living outside Britain, quite possibly in the same region where the Archer grew up. Other examples of children spending part of their childhood in distant households have been noted in recent studies of Bell Beaker individuals in Bavaria, but the probable genetic ancestry of the Amesbury Archer and the Companion provides the first hint that ties within Bell Beaker kinship groups might have extended across several generations and also over long distances.

We have already mentioned that, aside from his gold ornaments, the Companion was given a much less wellfurnished burial than the Archer. Apart from a small number of flint flakes that could have been incorporated into the backfill of the grave by accident, the only other certain grave good was a boar's tusk. There were four tusks in the grave of the Archer and, at the time of the original excavation report, the possibility was considered that they had been used to smooth and burnish metal objects. Since then, research on the grave of a Bell Beaker metalworker found in the Czech Republic has identified traces of metal embedded in boar's tusks, confirming that they were indeed used in this process. The possibility merits further research: will there be another twist in the remarkable stories of the Amesbury Archer and the Companion?

Further information

Salisbury & South Wiltshire Museum is located opposite Salisbury Cathedral; for more information on visiting, see *https:// salisburymuseum.org.uk.*

Some the finds from the grave of the Archer are on display in *The World of Stonehenge*, an exhibition running at the British Museum between 17 February and 17 July 2022 (see p.22 and CA 383).

Further reading

- A P Fitzpatrick (2011) The Amesbury Archer and the Boscombe Bowmen: Bell Beaker Burials at Boscombe Down, Amesbury, Wiltshire, Salisbury, Wessex Archaeology Report 27.
- I Olalde et al. (2018) 'The Beaker phenomenon and the genomic transformation of north-west Europe', Nature 555: 190-196, https://doi.org/ 10.1038/nature25738
- N Patterson et al. (2021) 'Largescale migration into Britain during the Middle to Late Bronze Age', *Nature*, 27 January 2022, *https://doi.* org/10.1038/s41586-021-04287-4.