The Bare Bones

Explore the Early Neolithic Chambered Cairns of the North Channel

"As I stand on the mountainside and look down upon the valley I am looking down not only on the chapel or church but also on the churchyard, the place of burial, the place of death. The churchyard, where my father lies and my mother, in their mortal remains, and the generations from which they came, is a peaceful and consoling place. This is the elemental earth from which I came, as they, my forefathers and mothers, came and to which I shall return. In a sense these people are not where their bones lie; they are elsewhere, as I too shall be as they place my remains in the element of the earth or the element of the fire"

Noel Dermot O'Donoghue, *The Mountain Behind the Mountain*, 1993, 24.

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In memory of Caroline Wickham-Jones.

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The North Channel from Kintyre,
with Knocklayd mountain visible in the distance.

The Bare Bones

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Gavin Lindsay, Matt Ritchie and Alison Sheridan

◄ **Liz Myhill took inspiration from the Giant's Graves on Arran, with time and motion captured in the slow growth of the lichen, the swaying dance of the ferns and the quick gusts of wind in the air. The dramatic setting is explored through the lens of landscape, seascape and skyscape.**

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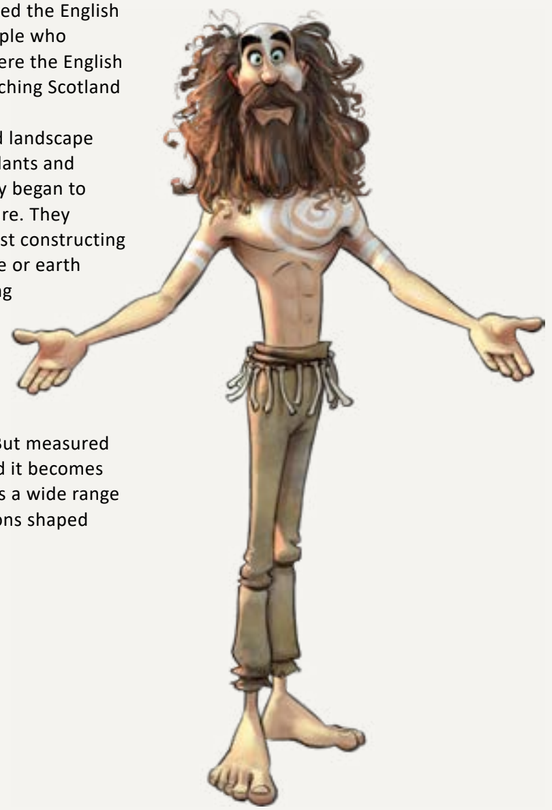
Contents

Introduction

The spread of farming across Europe from the Near East is an amazing story of how a new way of life was established by farmers who moved on to new land as their population grew. People were growing crops and tending domesticated animals from around 9500 BC in the Levant and by 9000 BC in Turkey. The first farmers had arrived on the near Continent from at least as early as 5000 BC, but it was not until the centuries around 4000 BC that they crossed the English Channel and came to live in Britain and Ireland. Some of the people who travelled to Scotland came from Nord-Pas de Calais, the area where the English Channel is at its narrowest, while others came from Brittany, reaching Scotland and Ireland along the west coast.

These Neolithic pioneers transformed the culture, lifestyle and landscape of our isles. They brought agricultural knowhow, domesticated plants and animals and radical new ideas about life and society. They quickly began to make clearings in the ancient wildwood for their crops and pasture. They needed space to farm and timber to build. And build they did, first constructing huge timber communal halls and impressive monuments of stone or earth to honour and remember their dead, then building enigmatic long linear monuments of timber and earth, before finally erecting ceremonial circles in timber and stone. You can read the story of these monuments in *The First Foresters* (2018).

The Neolithic in Britain and Ireland spans 1500 years or about 60 generations, from around 4000 BC to around 2500 BC. Measured in years, it is an almost unimaginable length of time. But measured in generations, the Neolithic period becomes easier to grasp, and it becomes possible to place individual lives within the timeline. It also spans a wide range of different regions and landscapes, with distinct cultural traditions shaped and shared between them.



◄ **The Clyde cairn of Boreland in Galloway survives as a huge mound of stone.**

In this booklet we will concentrate on only a few generations living in one particular region, and we will focus upon the distinctive monuments that they built. The descendants of the early Neolithic pioneers who arrived in the Atlantic-facing areas of south-west Scotland and the north of Ireland in the centuries around 4000 BC built *megalithic* monuments known as Clyde cairns and court tombs respectively. The architecture of these stone-built chambered cairns suggests their use both as a place for the dead, where people placed the deceased within the chambers inside the cairn; and as a place for the living, where people could pay their respects within the ceremonial forecourt outside the cairn.

> *"Quite a few are almost intact, but it is also worth bearing in mind that many have been damaged in the past, or have not yet been fully exposed. Sometimes there will be no more than a collection of large stones, with no obvious shape or function. Gorse or heather may make it hard to see a stone never mind a tomb, and the monument may only be visible on close inspection. Where this is the case, the present-day remains are usually the last surviving pieces of a much larger monument. The missing portions of the site may have been lost or removed over many centuries of exposure to weather, people and animals"*
>
> **(Harry Welsh, 2011, 2)**

Of those that survive, some remain clothed, their secrets hidden beneath huge mounds of stone, such as **Boreland** in Galloway. Some bear the ravages of time, their features masked by rubble and collapse, such as **Torran Loigste** on Arran. Some have been disturbed by treasure-hunters, their chambers ripped open and exposed, such as **Ballymacdermot** in County Armagh and **Cloghanmore** in County Donegal. Some have been robbed of stone from their covering cairns, and survive only as skeletal outlines, such as **Giant's Graves** on Arran, **Aghanaglack** in County Fermanagh, or **Gort na h'Ulaidhe** on Kintyre. And some have been rebuilt as ruins, and presented to the public, such as **Creevykeel** in County Sligo. However, many more have been lost over time, with only a handful recorded as ghostly plans in the pages of antiquarian journals or spectral sketches in the notebooks of their excavators, such as **Lochhill** near Dumfries.

The court tomb of Ballymacdermot in County Armagh sits on the inward-facing slopes of the Ring of Gullion. It has a single gallery divided into a narrow *antechamber* and two chambers. Two *sill stones* define the antechamber, while two large *jamb stones* define the two chambers. In 1816, John Bell of Killevy Castle and the local landowner Johnathon Seaver opened the tomb and found "an urn containing pulverised bone".

The archaeological study of these ancient chambered cairns can reveal only the bare bones of their story, leaving much to the imagination. They were built by a vibrant society with beliefs, traditions and practices that would seem very strange to us today. Were the ceremonies that accompanied the placing of the dead in these monuments small family affairs or large communal gatherings? Were there drums and chanting, dancing and trance-like states? Perhaps there were grand fire-lit feasts with songs, speeches and toasts? Or were there solemn torch-lit processions, arcane rituals and strange incantations?

Archaeologist Gabriel Cooney observed that it is in places associated with the dead that we can come closest to the lives of Neolithic people. “In visiting such monuments,” he wrote, “we do so in a physical sense because we are sharing and experiencing the same space that people created in the Neolithic. We feel it also in an emotional sense, both because of the physical sensation and also because we know that we are in a special place, built by people to house the dead. In that sense we are also visiting the ancestors” (2000, 86). Thinking about how these early Neolithic pioneers experienced life and death can help us better appreciate our own experience of space, place and community – for while they may be far removed in time from our own ancestors, their lands are our lands, and we are not far removed in place.

As the experienced tomb traveller Harry Welsh wisely notes, “we are extremely fortunate that many of these monuments, hugely important to our historical landscape and cultural heritage, have been preserved for the enjoyment of present and future generations” (2011, 1). The chambered cairns of the North Channel remain an important connection between people and place across the millennia – markers of place, then and now.

The Bare Bones aims to help teachers use the study of Clyde cairns and court tombs as a cross-disciplinary classroom topic as part of the *Curriculum for Excellence* (Second Level), blending history, geography, human anatomy and the creative arts. By visiting chambered cairns local to the classroom, outdoor archaeological learning can help develop a sense of place, with information being readily available in national monuments records such as Pastmap and the regional historic environment records. By taking an archaeological approach, learners can begin to understand and analyse the remains on the ground, and to appreciate the difference between *objective recording* and *subjective analysis*. And by taking an imaginative approach, learners can become **Tomb Keepers** themselves, and begin to explore the *narrative interpretation* of the ceremonies that may once have taken place.

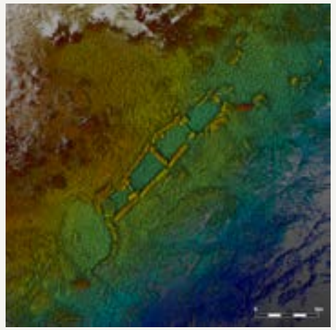
The Giant’s Graves on Arran comprise two Clyde cairns, one large and one small. The larger of the two survives as a wide forecourt with two fallen flanking stones leading to an impressive segmented chamber. A rear-facing forecourt and chamber is aligned behind the main chamber, in a manner very similar to the dual court tombs of Ireland.

◄ **A 3D model of the Giant's Graves, annotated to show the shape of the cairn.**
© AOC Archaeology

Our core activity will help learners become **Bone Detectives** examining the bones found within a chambered cairn. By analysing an *assemblage*, learners can work out how many individuals were buried and what the bones can tell us about their lives and deaths. Along the way, learners will be following similar processes and applying similar ways of thinking as osteoarchaeologists, offering an insight into an archaeological career pathway, and demonstrating the problem solving and critical thinking skills that lie at the heart of all archaeological work.

In recent years, new methods of digital documentation have been introduced to archaeology. Photogrammetry and 3D laser scanning technologies provide detailed methods of *objective recording* which can be used to appreciate the scale and form of chambered cairns. *The Bare Bones* is richly illustrated by these new technologies, alongside drone photography, archaeological measured drawings and a host of new imaginative visualisations created especially for this publication.

The booklet also focusses on the important contribution being made by re-evaluating earlier archaeological work and by completing and publishing more modern 'backlog' or 'legacy' excavations. In doing so, it aims to support both *Scotland's Archaeology Strategy* and the *Heritage Ireland 2030* strategy, and to contribute to the international *Boyne to Brodgar* archaeological research framework, which aims to increase engagement with and raise awareness of this early chapter in our shared heritage, developing the understanding of the Neolithic across Scotland and Ireland and placing it within its wider European narrative.



The dual court tomb of Aghanaglack in County Fermanagh has twin galleries, each divided into two chambers by *jamb stones* and a low *sill stone*. Both galleries share a huge back stone. It was recently the subject of an archaeological measured survey by laser scanner. ►
© AOC Archaeology

Outdoor archaeological learning

The Bare Bones is the latest in a series of publications from Forestry and Land Scotland that take a creative and imaginative approach to outdoor archaeological learning. The booklets present some quite complex and sometimes unconventional ideas, and use archaeological discussion, creative indoor activities and practical outdoor learning to imagine ancient landscapes, explore today's historic environment and understand contemporary archaeological methodology.

> *"Archaeology is the study of the human past through its material remains. Through archaeological research and analysis of our places, artefacts and ecofacts, everyone can explore, better understand, value and care about the prehistory and history of Scotland's people, culture and landscape"*
>
> **(Scotland's Archaeology Strategy, 2015).**

By engaging pupils in outdoor learning and conducting meaningful research within the classroom, archaeological learning can provide real and cohesive links across a range of curricular areas. Archaeology can help develop critical thinking skills, exploring the evidence that our shared past has left in our culture and environment. The methodology of archaeology requires the objective study of material culture alongside its *subjective analysis* – and, because archaeology is the study of the past in the present, it can encourage reflection on our own attitudes, culture and society.

The booklets are the result of many different contributions and collaborations from a range of professions, including foresters, ecologists, archaeologists, dendrochronologists, educators, artists and photographers, all working together to present a fresh take on the interpretation of our ancient past and contemporary archaeological science. The booklets are aimed at teachers, youth group leaders, archaeological educators and anyone interested in our natural and cultural heritage.

◄ **The Clyde cairn of Torran Loigste on Arran survives as a spread mound of stone, its court and chamber just about visible amongst the rubble. In this vertical aerial photograph, you can see the curve of the forecourt (centre bottom), the narrow chamber (centre), and the *capstone* of a lateral chamber (left hand side). There is a very Irish feel to the deep curve of its forecourt.**

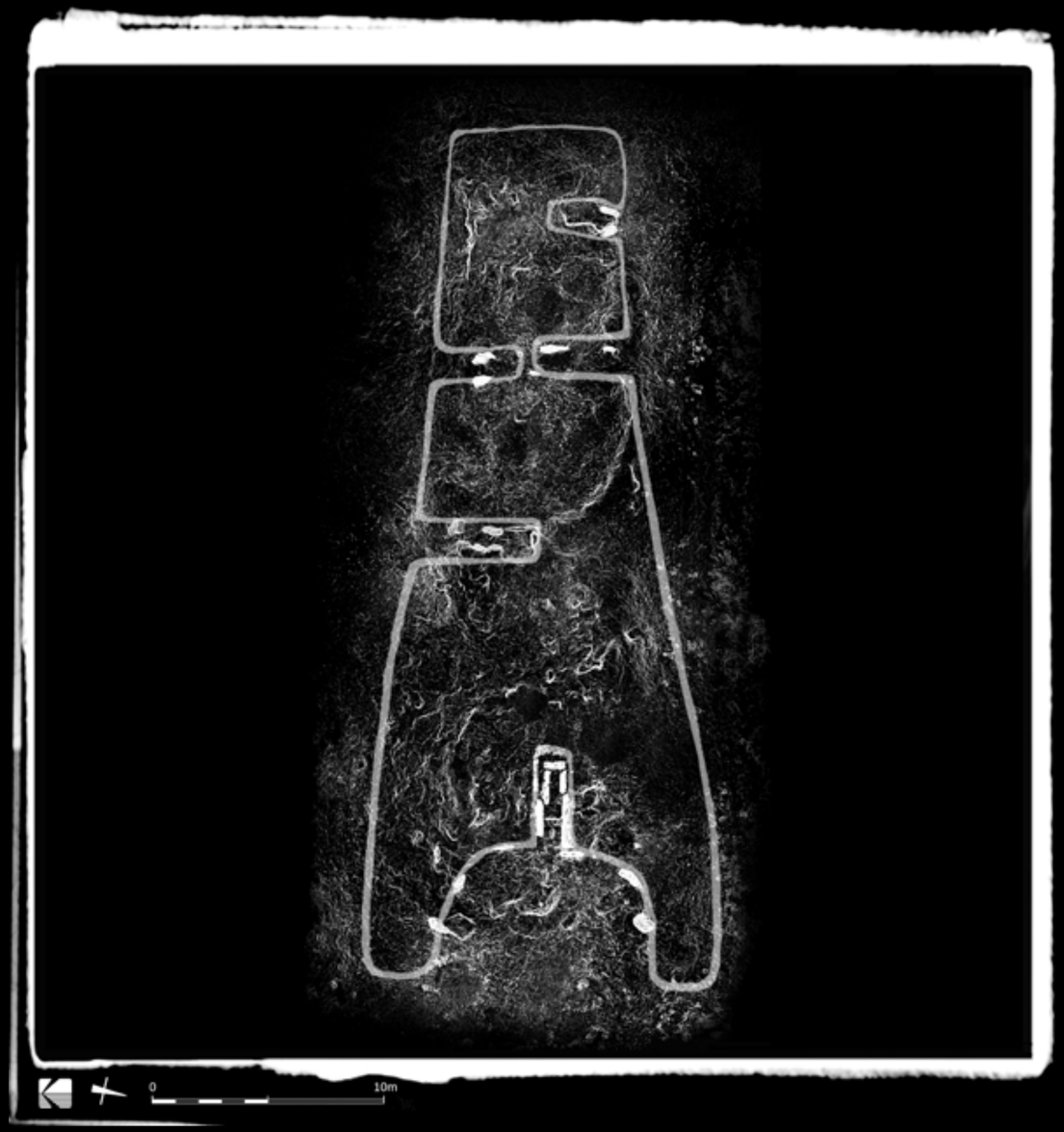
As both reference material and learning resource, these booklets use a popular communication style and bold design to prepare the practitioner with detailed knowledge and innovative ideas for their learners. They provide the links between indoor learning and outdoor activity, bringing the indoors outside and the outdoors inside.

- ***Into the Wildwoods*** describes the lives of the Mesolithic wild harvesters. Rooted in an ecological understanding of place and time, the booklet explores the roles of interconnected habitats, natural resources and seasonal change.
- ***The First Foresters*** describes the lives of the Neolithic pioneers who followed, and uses today's native woodlands to explore our human response to trees and woodland.
- ***A Song in Stone*** celebrates Scotland's internationally significant outdoor gallery of Atlantic rock art and the shared cultural tradition that it represents. The booklet uses an inspirational blend of *objective recording*, *subjective analysis* and *narrative interpretation* to encourage critical thinking and creative arts.
- ***To Build a Broch*** presents an illustrated narrative, a story of complex structural engineering and bold architectural design, and an amazing vernacular tradition that was the height of fashion over 2,000 years ago.
- ***Dendrochronology*** explores the science and methodology of tree ring dating, presenting activities that range from measuring a core sample to building a classroom timeline of over one thousand years.

Quotes from leading archaeologists in each field help to make the key ideas more accessible, and short personal features focus on important sites, describe personal experiences or explain archaeological methodology. Short features can be used as reading tasks in the classroom, and associated learning suggestions include ideas for classroom posters, exhibitions, critical thinking and creative writing, illustrated presentations and creative art.

The booklets celebrate the importance of outdoor and archaeological learning, and reward interested practitioners with accessible background information, unconventional ideas and exceptional artwork and design. The aim is to uncover an ancient past that is still accessible today, rooted in an archaeological understanding of place and time and in our human response to both.

The full court tomb Creevykeel in County Sligo has been rebuilt and presented to the public. In this vertical aerial photograph you can see the unroofed courtyard and the gallery and subsidiary chambers, set at the rear of the cairn and opening towards the sides. Both the gallery and subsidiary chambers would have once been roofed.



The Clyde cairn of Gort na h'Ulaidhe on Kintyre survives as a skeletal outline, shown here from the air and as an annotated plan.

Carmahome ‘23

ARCHAEOLOGIST **CLARE ELLIS** DESCRIBES THE RE-EXCAVATION OF CARMAHOME, A VERY EARLY NEOLITHIC SIMPLE PASSAGE TOMB ON ARRAN, ALMOST ONE HUNDRED YEARS AFTER THE FIRST ARCHAEOLOGICAL INVESTIGATION

Just finding the simple passage tomb of **Carmahome** was a challenge. We had to navigate through dense plantation and struggle along boggy forest rides, until we finally found it: a little moss-covered mound in a small clearing. Every day that energy-sapping walk, laden with tools and equipment, felt more and more like a pilgrimage – but more and more each day rewarded us with a little bit more knowledge, as the site revealed its secrets.

The monument had previously been excavated over the course of two days in 1924 by the landowner Mr James Craig and his friend, the archaeologist Ludovic M’Lellan Mann. This excavation revealed a round cairn with a central chamber, surrounded by a circular kerb of ten upright stones with a narrow passage leading into the central chamber. *“We dug deeper into the cairn,”* wrote Mann, *“and the supposed rough pavement turned out to be loose stones fallen into the central cavity and embedded in peat growth. These stones were lifted out, and at a depth of about three feet from the original heathery top we came upon a perfectly level flooring consisting of two large slabs and a small one, all neatly laid and fitting one into the other. This pavement was the flooring of a well-constructed circular chamber, with walls formed of vertically set slabs.”*

“The floor was swept and the soil carefully sifted by riddle and hand, but no relics were found. It is clear that the contents of the chamber had been subjected to some previous scrutiny, and that the chamber itself had originally been covered by a capstone, removed a considerable time ago for building or other purposes” (1925, 252).

Our first job was to carefully remove the vegetation from the site, before removing the peaty soil away from around the base of the passage tomb to reveal its lateral extent. The northern side of the tomb had clearly suffered more disturbance and collapse. Although the west-facing passage into the chamber was evident, it was filled with soil and rubble. Eight *orthostats* formed the chamber, the base of which was covered by a thick layer of sphagnum moss. This peeled off to reveal a beautiful flagstone floor. We were now ready to plan the monument and record what was visible before the start of excavation.

Because the monument had been excavated in 1924 we knew that there would be no finds within the chamber. However, we hoped that something datable would have survived below it; perhaps a buried soil or the remains of a funerary pyre. We first excavated a slot trench from the back of two of the chamber *orthostats* to the edge of the excavation area. We discovered that the material between the chamber *orthostats* and the ring of kerb stones comprised a random mixture of turf, soil and sandstone rubble. This material had been ‘thrown’ in on top of the original topsoil, but not before the cairn’s builders had trodden in a layer of crushed sandstone fragments in order to make the soil less sticky to work upon. Luckily for us, this initial phase of excavation revealed that Mann’s account of his excavation was exaggerated, and was not quite as thorough as implied.

◄ **Clare at Carmahome.**

As we excavated down onto the top of the rubble within the passage, we found sherds of a fine Beaker pot crushed between the rocks. This Early Bronze Age pottery dates to around 2450 – 2300 BC and represents a later phase of use. Within the chamber, cremated bone was found pressed into the cracks between the chamber *orthostats* and the smaller packing stones which held the two large flagstones in place; it was clear that these deposits had not been disturbed since the Early Bronze Age. Our excitement grew as we realised that the simple passage tomb had been reused as a place of burial in the Early Bronze Age but only after the partial collapse of the original Neolithic monument. This meant that undisturbed Neolithic material could possibly survive below the flagstones.

Equipped with a wire rope winch, a couple of pinch bars and rounded fence posts, we carefully cleaned around the smaller flagstone and winched it down the previously excavated passage. At the junction of the passage and chamber we discovered the base of a pottery vessel which (because of the waterlogged nature of the chamber) had almost turned back to clay. Because it was so fragile, we lifted the pot with the surrounding soil so that it could be carefully excavated back in the laboratory.

Two of the chamber *orthostats* were then lowered into the previously excavated slot trench. This gave room to pull the largest flagstone out over the top of the two chamber *orthostats*, deconstructing the site in order to allow access to the layers below. We confirmed that the largest flagstone was originally a *capstone* that formed part of the roof of the monument and the smaller flagstone was originally one of two internal uprights that had been placed upon the original chamber floor and upon which the large *capstone* had been balanced.

The original chamber floor comprised a layer of crushed sandstone into which a tiny piece of cremated bone had been trodden, but otherwise the chamber was disappointingly bare. Clearly the passage tomb had been robbed of its content before its collapse and reuse in the Early Bronze Age. However, we had one more chance of finding Neolithic material and that was below the original floor. Roughly at the centre of the chamber we discovered a small irregular shaped pit filled with charcoal and tiny fragments of cremated bone. This appears to be the primary deposit around which the whole monument was constructed. The deposit was collected in its entirety for further analysis.

Our final act was to reconstruct the monument in the form that we had found it. Lifting and moving the stones with the aid of a wire rope winch and a couple of pinch bars was relatively straightforward, but very much a team effort involving much discussion. We thought about the original builders, who would have selected and transported the sandstone blocks from somewhere nearby, using timber levers, rollers, ropes and muscle in what must have been a collective effort to mark a place that was special to them.

The act of excavation is inherently destructive. In 2023, two of the chamber *orthostats* were lowered into the slot trench that had been cut through the cairn, allowing the largest flagstone to be pulled out and enabling access to the deposits beneath. The simple passage tomb has now been reconstructed.

A place to remember

"Accounts of chambered cairns and their contents are like descriptions of masks. Masks are symbols of ideas, and so in a sense are the remains of tombs; and behind them was a complex, living reality"

(Patrick Ashmore, 2000, 29).

The farming way of life, with its associated beliefs and ways of doing things, was introduced to Britain and Ireland by groups of farmers migrating from northern and north-western France. They came from different parts of the French coast – some from the Morbihan area of Brittany, some from Normandy, others from Nord-Pas de Calais – to different parts of Britain and Ireland, at various times between around 4350 BC and 3800 BC. They came for different reasons, and their arrival met with varying reactions from the indigenous communities of Mesolithic wild harvesters that they encountered. In some cases, as DNA evidence is revealing, they came in large numbers – many hundreds, probably several thousands (although it can be hard to put an exact figure on it).

These pioneering first farmers targeted good agricultural and grazing land and made clearings in the woodland to create space in which to live and farm, using boats to move easily along rivers and coasts. They grew cereals – wheat, barley and some oats – and grew flax for its nutritious seeds and oil, and for making textiles. They kept domesticated cattle, sheep, goats and pigs, and they also hunted wild animals and gathered plant foods – but they did not eat fish, shellfish or other sea creatures, probably because these were thought to be taboo foodstuffs.

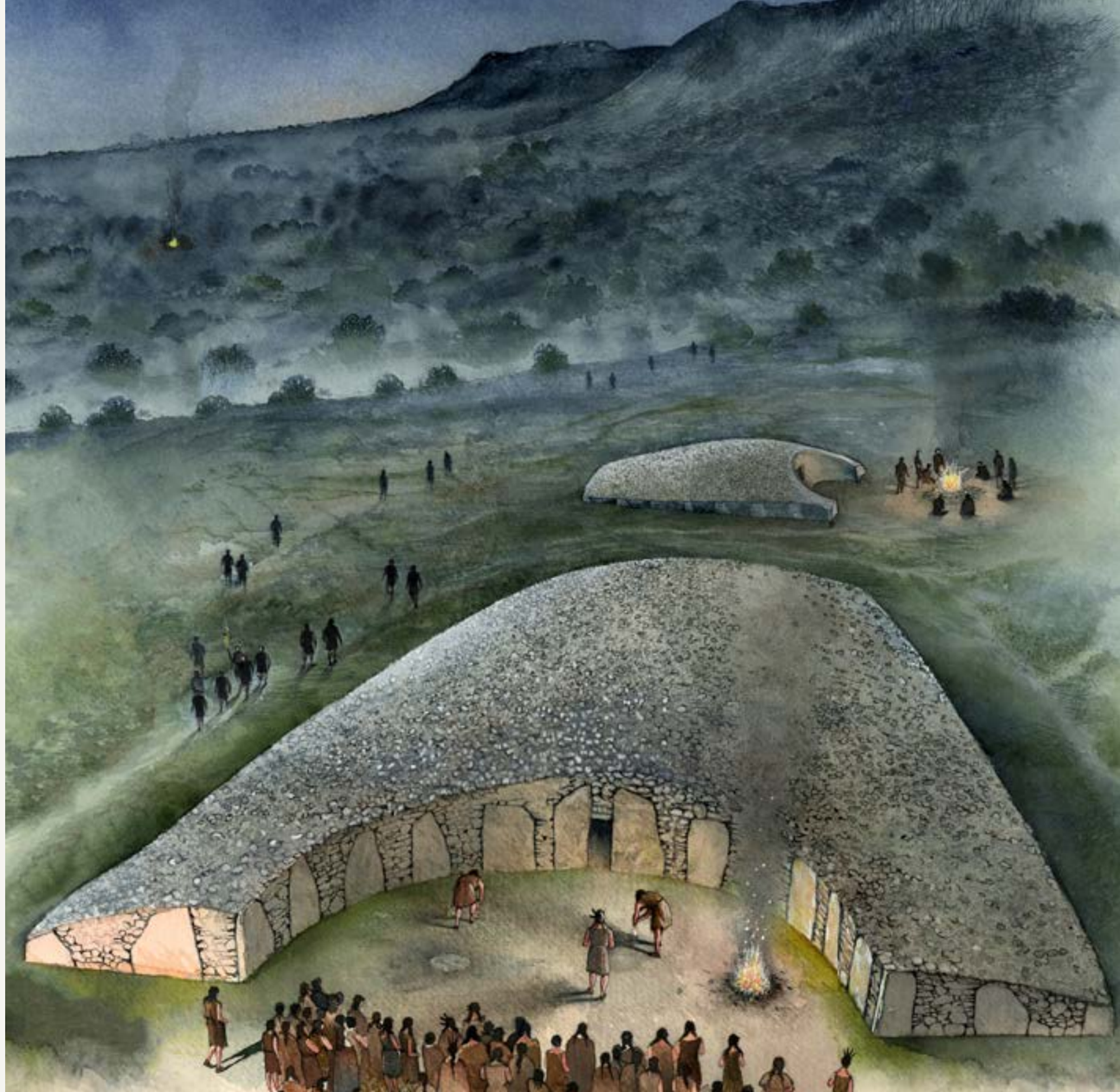
Archaeologist Caroline Wickham-Jones described a land of bread-makers, "where small-scale cereal production by individual communities formed an economic mainstay, alongside the husbandry of cattle, sheep and pigs" (2010, 56). They processed milk into cheese and probably also butter, yoghurt and other fermented products, and they used their round-based pottery for cooking and serving food. They shaped stone and wood for their tools. However, they were totally unaware of metal, which did not start to be used in these islands until around 2500 BC. They ground and sometimes polished their stone axeheads, setting them in wooden hafts, and knapped fine leaf-shaped arrowheads out of flint and other types of stone. They used organic materials such as willow withies, rushes, plant roots, tree bast and animal skins to make a variety of useful items including baskets, clothing, rope and wattle work fencing, and they also made tools of bone and antler. For their dead they built funerary monuments out of timber, stone and earth.

The funerary monuments of these early farming communities have long inspired interest and curiosity, surviving seemingly unchanged over nearly six millennia in an otherwise ever-changing landscape. Their story is a complex one, with different traditions appearing and evolving over time. It is also a story that varies depending on place, with distinct regional styles of monument in evidence. Small Breton-style chamber tombs (closed *megalithic* chambers and simple passage tombs) appear very early in the story, and relate to the arrival of farmers from the Morbihan region of southern Brittany, sailing up Britain's western seaways. These distinctive monuments are few in number and are only found on the west coast of Scotland (like the simple passage tomb of **Carmahome** on Arran), the north-west and south-west tips of Wales, the coast around the northern half of Ireland and possibly also Cornwall.

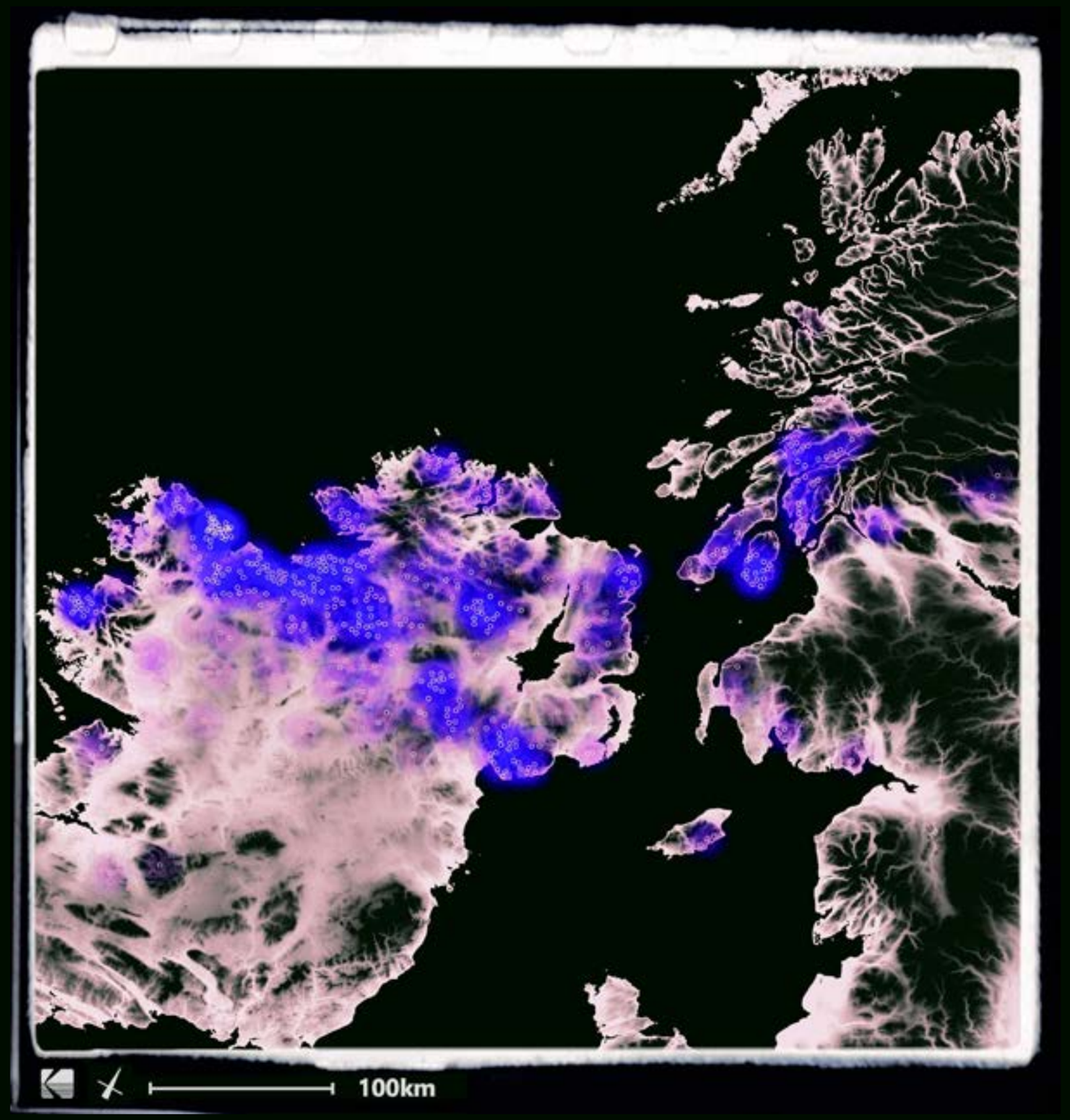
The earliest funerary monuments of the farmers who arrived from Nord-Pas de Calais sometimes featured the use of rectangular timber mortuary structures in (or on) which the dead were placed. These were then often burnt down and covered by a long or a round mound of earth or stone. Other practices of these settlers included open-air cremation on a pyre, with the remains then covered by a round mound.

In Scotland, there is an escalation and a geographical expansion in monument building from around 3750 BC, as the population of the initial settlers grew, expanding to colonise other parts of Scotland, including the Northern Isles and the Outer Hebrides. Larger, slightly more elaborate and regionally variable versions of passage tombs were built, and in south-west Scotland the tradition that had featured the use of timber mortuary structures developed into one featuring simple rectangular stone chambers under round cairns, as at **Mid Gleniron** in Galloway and **Blasthill** on Kintyre, and more complex stone chambers under rectangular or trapezoidal (wedge-shaped) cairns with forecourts. These were the Clyde cairns. Ireland saw a similar, parallel development of the passage tomb and the non-*megalithic* monument building traditions, with court tombs – the counterparts of Clyde cairns – being built over much of the northern half of the island. Portal tombs, with their distinctive large *capstones* and distribution around the Irish Sea, represent a variant on the 'translation into stone of the timber mortuary structure' phenomenon. Elsewhere, other regionally-specific types of funerary monument emerged, including the Severn-Cotswold tombs of south-west England and south-east Wales.

"These various types all have chambers into which bodies were placed," explain archaeologists Duncan Garrow and Neil Wilkin in *The World of Stonehenge*, "but in each area they were constructed and arranged in different ways, reflecting distinct regional architectural fashions… The strong regional patterning in tomb architecture reflects other developments occurring over the same period, such as the emergence of regional pottery styles, demonstrating that specific local identities were becoming stronger" (2022, 60).



The large open forecourt at Giant's Graves ► must have enabled quite a crowd to gather – perhaps as observers, perhaps as participants and perhaps as both.



Regional connections

The early Neolithic farming communities that settled in south-west Scotland and the north of Ireland quickly created networks within and around this ‘North Channel’ area of coastlines, seaways and islands. These networks connected the communities to each other, and were the means by which materials, objects, people and ideas could be exchanged. They had an important role not only in ensuring that communities did not become inbred, but also in offering security and help through alliances, kinship and shared traditions, and providing access to desirable objects and materials. They also helped to create and maintain a sense of identity beyond the level of the immediate community. There is plentiful evidence for close links, not only across the North Channel but also along the west coast of Scotland, where people descended from Breton settlers mixed with descendants of settlers ultimately from Nord-Pas de Calais, as well as with the indigenous wild harvesters.

The links across the North Channel are reflected in the objects that people used. Axeheads made from the distinctive, bluish-grey speckled porcellanite quarried on Tievebulliagh mountain and on Rathlin Island in County Antrim were taken to south-west Scotland and well beyond, being found elsewhere in Scotland including the Isle of Lewis and Shetland, on the Isle of Man, and over much of England. Good quality flint from around the Antrim coast, and artefacts made from this flint, were taken to south-west Scotland, while pitchstone – a volcanic glass – from the Isle of Arran was taken in the opposite direction to Ireland. Close links are also shown in the design of the pottery in use on both sides of the North Channel. One type of pot illustrates this particularly well – a small, fine, thin-walled bowl with an inturned neck and fine and distinctive decoration, derived from a Breton pottery tradition. This fascinating story is explored later.

These flint axeheads from County Antrim were found in a hoard at Auchenhoan near Campbeltown.

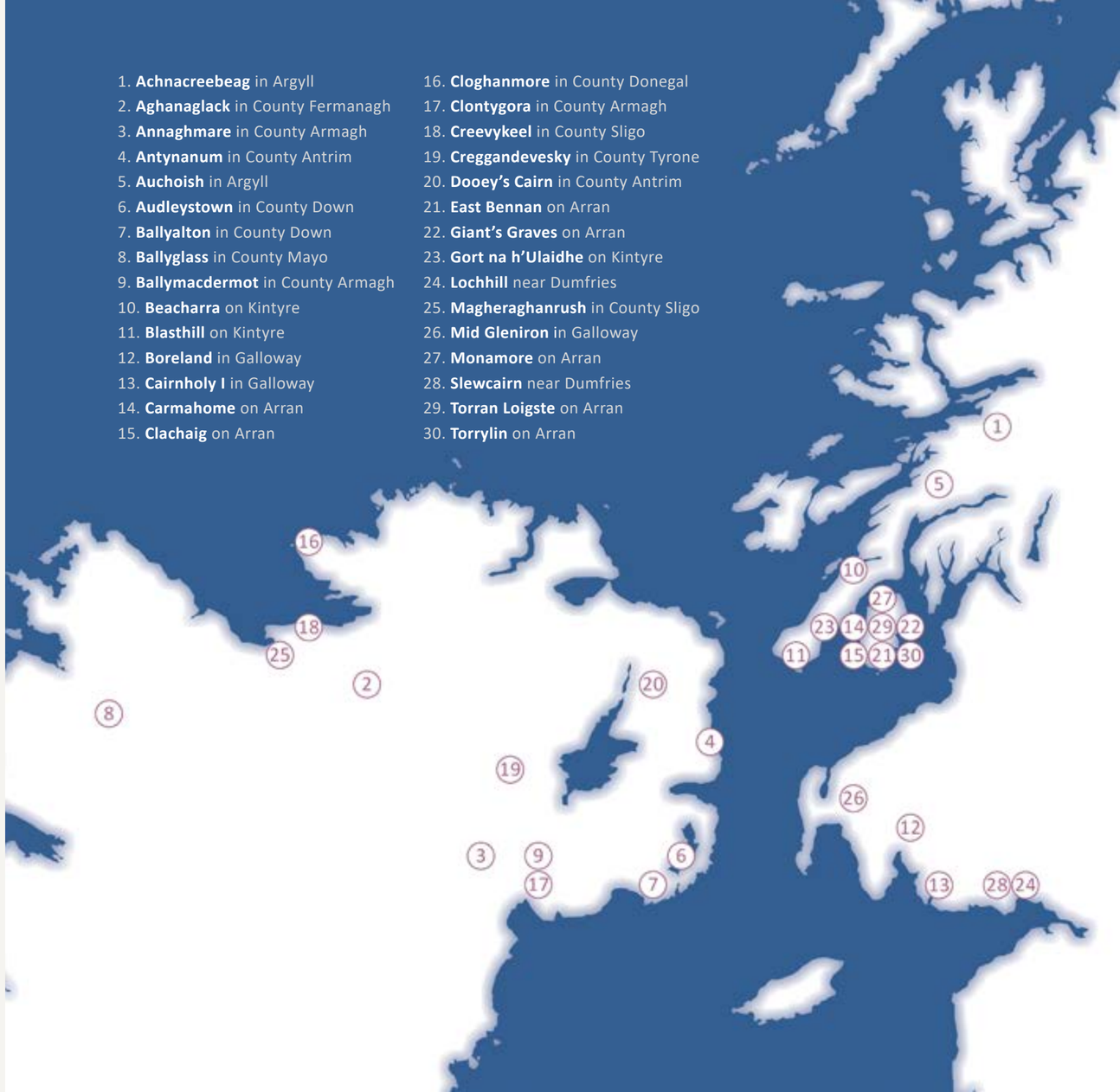
◄ **The North Channel is the strait between south-west Scotland and north-east Northern Ireland. It begins north of the Isle of Man, where the Irish Sea ends, and runs north-west into the Atlantic Ocean, and only 21 km separates the opposite coastlines at its narrowest point, between the Mull of Kintyre and Torr Head. Over five hundred Clyde cairns and court tombs are on record.**

Further evidence for these connections comes from the Clyde cairns and court tombs that were built by the descendants of the first farmers to settle around the North Channel. These distinctive monuments are evidence for a shared architectural tradition featuring the use of a rectangular chamber (often subdivided into two or more segments), a curving forecourt *façade* defining an area in which ceremonies to commemorate the dead could take place, and a cairn that was usually trapezoidal (or wedge-shaped) on plan. The main difference between Clyde cairns and court tombs is that in some Clyde cairns, the segmentation of the chamber was achieved by overlapping the side slabs whereas in court tombs, low *sill stones* were used. Irish court tombs also show a wider variability in their design.

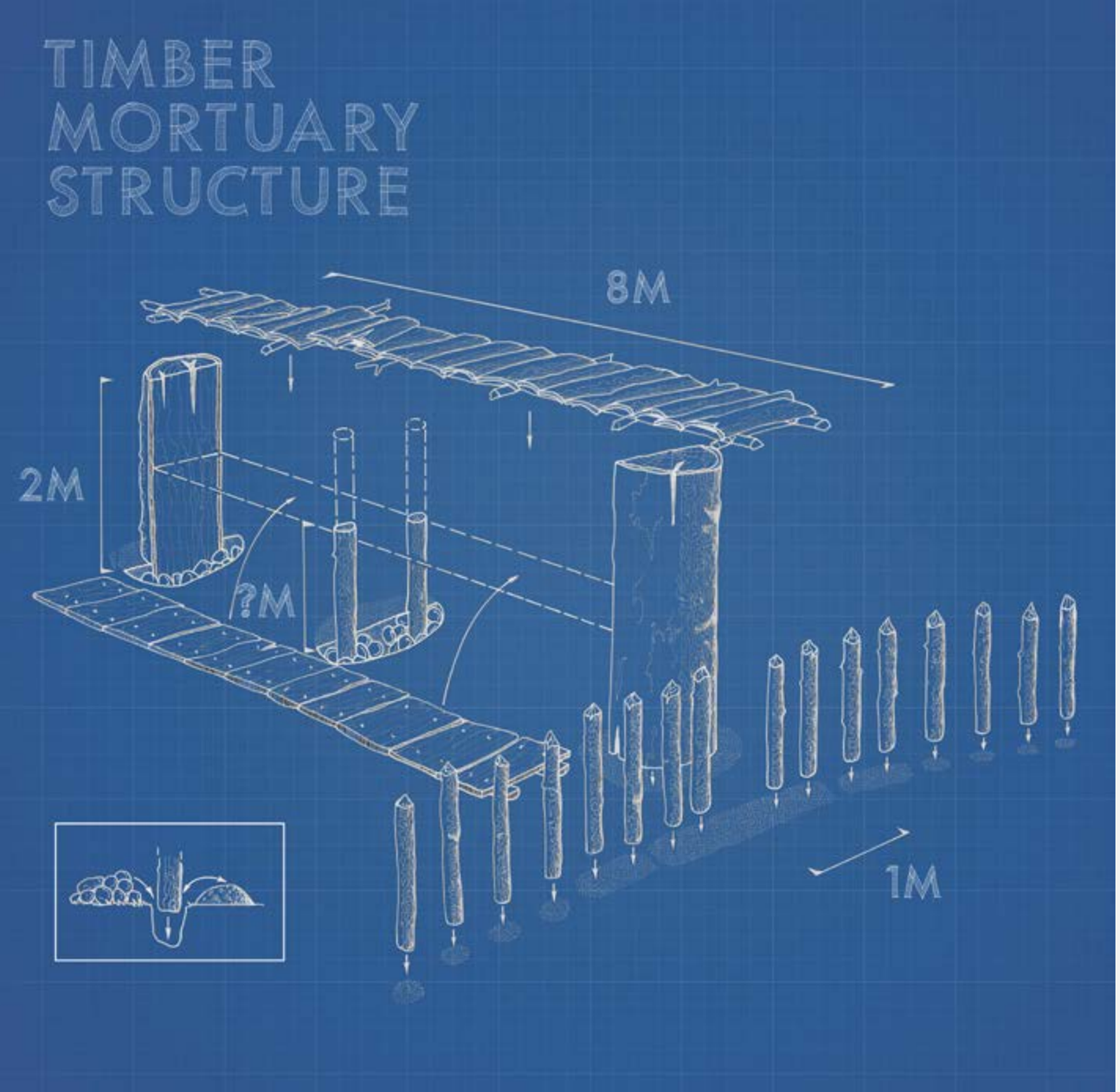
Both Clyde cairns and court tombs began to be built around 3700 BC. "Given the similarity and proximity of the two groups [of funerary monument]," observes archaeologist Barry Cunliffe, "with only the narrow North Channel to separate them, it is highly likely that the two regions maintained active contacts with each other" (2013, 154).

The regional connections linking communities across the North Channel were part of several overlapping networks. The distribution of portal tombs around the Irish Sea, which overlaps with the distribution of court tombs in Ireland but does not extend into Scotland, demonstrates contacts across the Irish Sea between Ireland, Wales and south-west England. The distribution of axeheads made of the distinctive, bluish-green volcanic tuff from Great Langdale in the Cumbrian Lake District reveals the operation of other networks, with many coming north into southern Scotland and huge numbers travelling elsewhere in England (especially to Yorkshire), but with relatively few ending up in Wales or Ireland.

When calling for a more regional-based approach to Neolithic research, archaeologist Gordon Barclay argued that "we must explore the characteristics that suggest shared origins and traditions" while adding a note of caution: "clearly there are strong relationships and shared traditions, but we can see these differences are greater than used to be thought" (2009, 3). On the southern fringes of the Highlands there are five Clyde-type cairns known in the upper valleys of the rivers Almond, Earn and Tay in Perthshire. Their presence so far east of the North Channel indicates that contact networks extended from the south-west into these more central regions, with communities sharing architectural and cultural traditions, ideas and beliefs – but perhaps less closely than we see in the cross-Channel relationships between Scotland and Ireland. "Behind the similarities and distinctions that can be recognised," noted archaeologist John Waddell, "there must lie complicated tales of kinship and regional contacts, as well as parallel evolution and divergence in both islands" (2022, 73).



Places mentioned in the text. ►
© Ian Kirkwood



Timber antecedents

If we want to understand Clyde cairns and court tombs, we have to know how the design idea came about – and the answer lies in the timber mortuary structures that have been found on either side of the North Channel at **Slewcairn** and **Lochhill** near Dumfries, and at **Dooey's Cairn** (also known as Ballymacaldrack) in County Antrim. Similar structures are also known from elsewhere in Britain, and their use is associated with the farmers who came over from Nord-Pas de Calais (although similar structures are yet to be found in France). At each of the three sites, the excavators found that stone cairns had been carefully and deliberately placed on top of the site of an earlier timber structure.

These timber mortuary structures were the first thing to be built at each site. They were rectangular, between 1 m and 1.4 m wide, and between 6.5 m and 8 m in length. Their remains are marked by a line of three large postholes. The end postholes each contained a split timber post measuring just over 1 m in width, fixed by packing stones and earth. These end posts had been made by splitting a thick oak tree trunk in half down its length, and were set upright with the flat side facing inwards. The posts cannot have been very tall, for they were set in holes measuring only 0.55 m (Slewcairn), 0.75 m (Lochhill) and 0.45 m (Dooey's Cairn) in depth; foundations not deep enough to have supported the weight of tall timbers. If we assume the ratio of posthole depth to post length was around 1:3.5, then at Slewcairn the posts are likely to have stood to a height of 1.88 m above ground level. At Lochhill, the excavator found that the central posthole contained two smaller posts, each measuring about 0.3 m in diameter, set opposite each other across the linear axis of the setting.

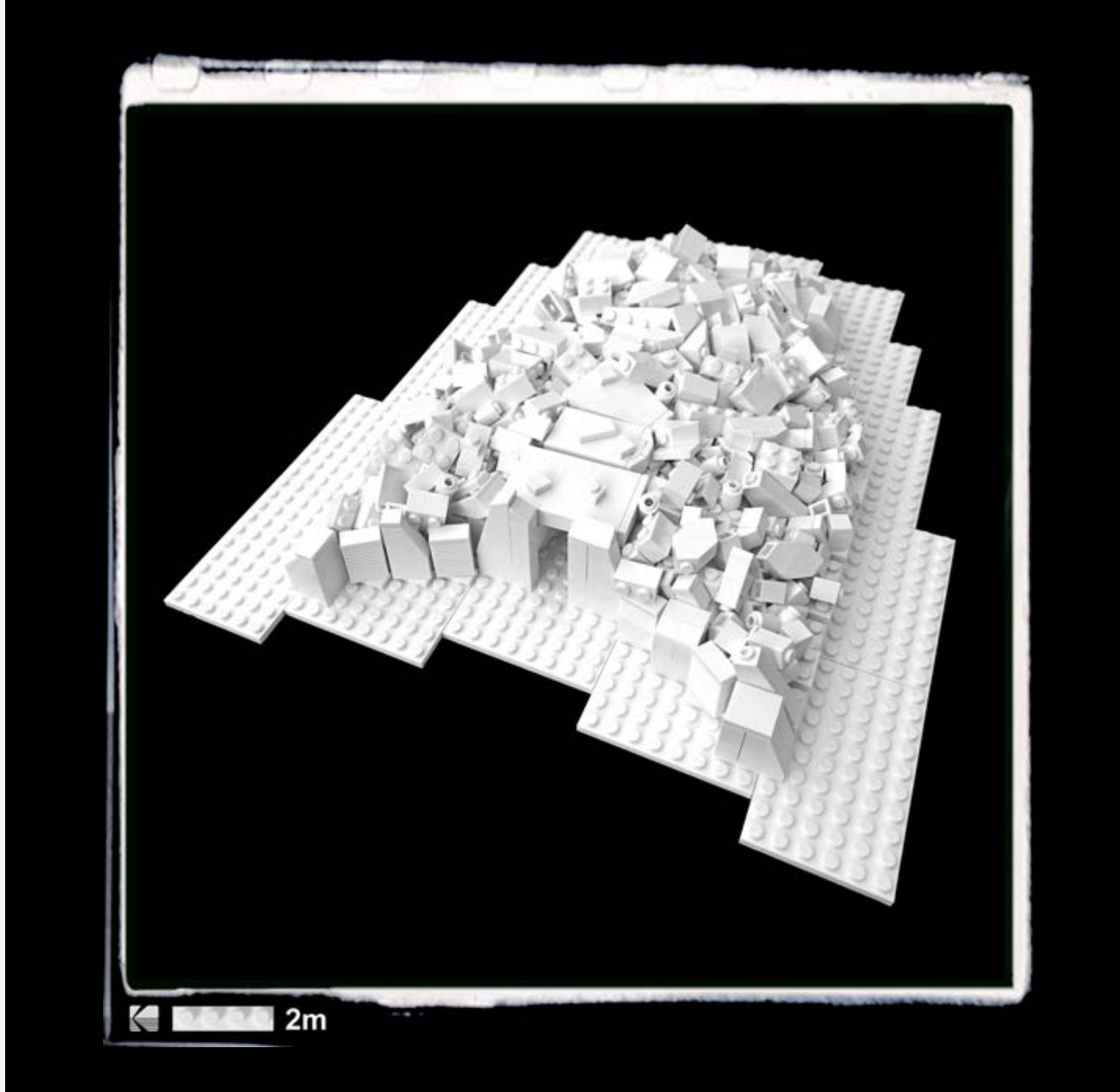
◄ **There is a lot that we don't know about the mysterious timber mortuary structures, but this stylised blueprint shows what we do know. They measured up to 8 m in length and around 1 m in width. Their remains are marked by a line of three large postholes. The end postholes each contained a split timber post set upright with the flat side facing inwards, fixed in place by packing stones and earth. The posts cannot have been very tall, perhaps only around 2 m in height, for they were set in holes measuring only around 0.5 m in depth. The central posthole contained two smaller posts, set opposite each other across the linear axis of the setting. Archaeological excavation at Lochhill recovered traces of oak planks running at right-angles to the long axis of the mortuary structure, suggesting that horizontal planking was used to form some sort of raised platform; and traces of birch bark, suggesting that the structure was roofed in some way with this water-proof material. A shallow, curving *façade* of short timber posts was erected just beyond one end of the mortuary structure to create a form of forecourt.**

At Lochhill, the excavator found traces of planking were found running at right-angles to the long axis of the mortuary structure, suggesting that horizontal planking was used to form a raised platform. Abundant traces of birch bark found at all three sites suggests that the structure was roofed (or at least covered in some way) with this material. The absence of any traces of walling along the structures suggests that they may have been open-sided.

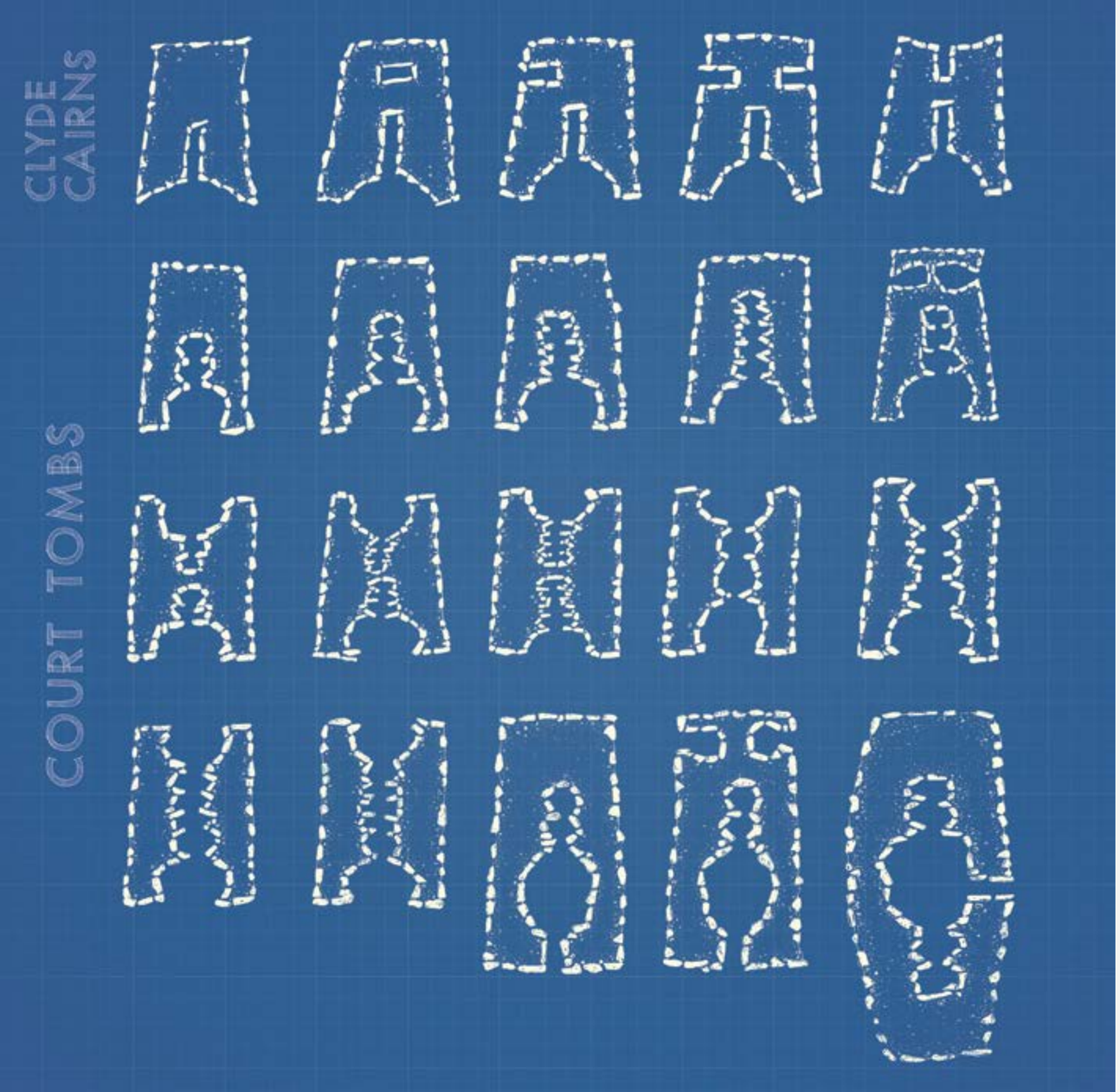
At Lochhill, a shallow, curving *façade* of posts was erected at one end of the mortuary structure, creating a forecourt area within which people could pay their respects to the dead. At Slewcairn, a paved area behind the mortuary structure may well have been used as part of the funerary practices. Pottery was found on it, suggesting the placing of an offering of food or drink for the dead.

What were these funerary practices? The cremated bone found in all three structures provides tantalising clues. Parts of one body were found at Lochhill, while at Slewcairn parts of seven people have been found and at Dooey's Cairn, parts of five or six. It appears that they were burnt when the mortuary structures were deliberately burnt down. While bones from all parts of the body, including fingers and toes, were found at Slewcairn, the amount of cremated bone does not add up to whole bodies' worth. At Lochhill, just part of a single adult male was present. So how can the missing bits be accounted for? Several scenarios are possible, and research continues on working out which may be the most plausible. It may be that corpses were laid out on the platform in the mortuary structure, and left to decompose to the point when some body parts could be taken away, leaving the rest. Alternatively, at Slewcairn, corpses may have been laid out on the paving and allowed to decompose, then body parts were placed within the structure before it was burnt down. Extensive osteological investigation on the Slewcairn remains has shown that there was still flesh on the bones when they were burnt, so we are not dealing with the burning of bare skeletons. At Slewcairn and Dooey's Cairn, did all the people die at the same time? Or were bodies added over several years? There is much that we still do not know.

The burning down of the mortuary structures was immediately followed by further building activity. On the footprint of where they had stood, people built stone walling. Large stones were thrown into the rectangular space while the embers were still hot, causing the stones to get partly burnt themselves. A stone cairn with a curving stone *façade* was built, to cover and seal in the remains of the dead. At Lochhill and Dooey's Cairn a stone *antechamber* was built in front of one end of where the mortuary structure had stood. Offerings were made in the forecourts and in these *antechambers*. The focus thus shifted from placing the dead within the timber mortuary structure and burning it, to *interring* the dead inside the stone tomb and closing it. The focus of the sequence became the forecourt, and the rituals of the living outside it.



A model of a Clyde cairn. ►



Stone translations

Returning to the question of how these timber mortuary structures relate to Clyde cairns and court tombs, it is clear that timber mortuary structures constituted the 'blueprint' for a series of stone monuments on either side of the North Channel, all featuring chambers that represent a 'translation into stone' of the rectangular timber format. In Scotland, the simplest of these are a series of modest rectangular stone chambers set within small round cairns, as at **Mid Gleniron**. Here, a pair of such monuments were subsequently encompassed within a single trapezoidal cairn. Slightly more complex in design is **Cairnholy I** in Galloway, where the tall stones at the narrow ends of a closed rectangular chamber echo the split-trunk posts of timber mortuary structures. The chamber, along with an *antechamber* in front of it, was set within a long rectangular cairn with a forecourt façade made from tall stones with drystone walling in between, very like the timber *façade* that was found at **Lochhill**.

By sealing in the dead in this way – within stone translations of timber antecedents – they were being monumentalised and memorialised. Those chosen did not comprise whole communities, but were instead specific individuals: men, women and children chosen for particular reasons. Perhaps they were selected so that they could be portrayed as the founders of the communities who built the monuments, so that future generations could say 'this is my land because my ancestors are buried here.'

Memorialising people in this way by building highly visible monuments in the landscape made a very powerful statement about identity, place and belonging. It is this commemoration in stone that is truly interesting, and reflects cultural traditions and practices shared across the North Channel. "The sequence at Dooey's Cairn," observed the archaeologist Gabriel Cooney, "is marked by a sense of continuity. The same place is chosen for successive mortuary structures, the stone chamber and cairn of the tomb being on the same long axis as the previous structures" (2000, 102).

The proto-Clyde cairn of Cairnholy I in Galloway.
© Matt Ritchie

The excavators of Cairnholy I, Stuart Piggott and T.G.E. Powell, noted that "the rear compartment, or chamber proper, had been severely plundered: its cist-like structure must have attracted immediate attention once it was brought to light during the robbing of the cairn" (1949, 117). This oblique view was generated by laser scanning.
© Historic Environment Scotland

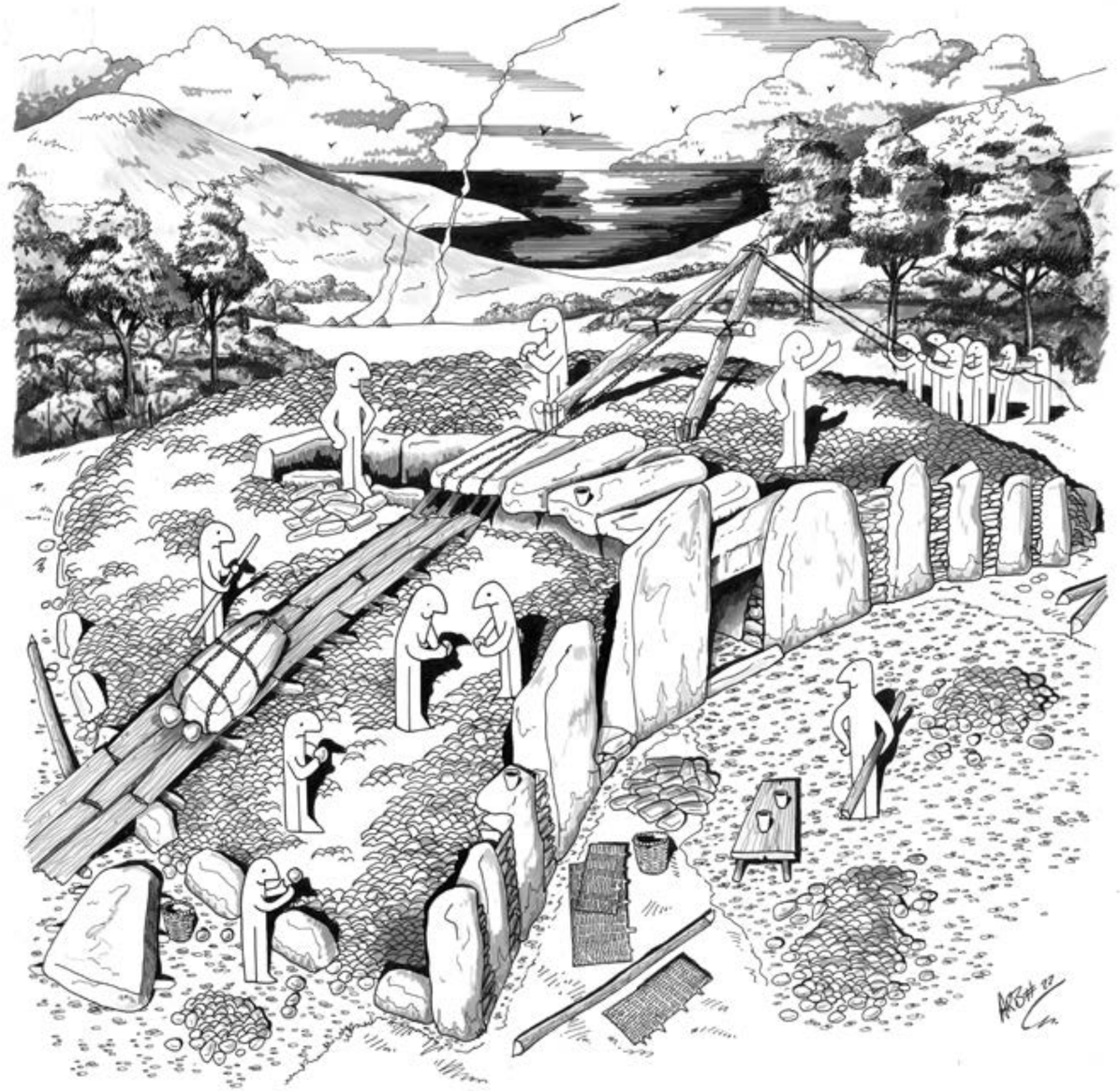
◄ **These stylised plans show the main similarities and differences between Clyde cairns and court tombs. A Clyde cairn has a narrow linear chamber that is often sub divided into compartments. It has a flattish *façade* ending in points, or a gently curving *façade* with square-ended horns. It can have additional chambers within the body of the cairn, lateral chambers opening towards its sides, or a rear chamber with its own façade. A court tomb has a gallery with between two and five chambers. It has a more concave forecourt, usually with square-ended horns. Occasionally, it will have subsidiary chambers set at the rear of the cairn and opening towards its sides. A dual court tomb has two courts, set at either end of the cairn and facing outwards. It can have two independent galleries each with between two and four chambers, or one shared gallery of between two and five chambers. A full court tomb has an enclosed court with a narrow entrance opposite its single gallery. A central court tomb has an enclosed court entrance set perpendicular to the entrances to its two galleries.**
© David Connolly

Clyde cairns

There are just over one hundred Clyde cairns recorded, with most found in Argyll, Arran and Bute and around the coast of south-west Scotland. The densest concentration is around the southern half of the Isle of Arran. Most comprise a substantial cairn of stone and earth that is rectangular or trapezoidal on plan, enclosing a narrow chamber made of stone slabs set on their ends. These stone slabs are known as *orthostats*. The chamber is often subdivided into segmented compartments by overlapping the ends of the chamber slabs, or else by high *septal slabs* or low *sill stones* (with or without *jamb stones*) that served as a kind of threshold, as seen at **Torrylin** on Arran. The chamber usually contains two compartments, as at **Gort na h'Ulaidhe**, or three compartments, as at **Monamore** on Arran; but can number up to five compartments, as at **East Bennan** on Arran. The chamber was roofed by large flat *capstones* laid across the *orthostats*. The roof was generally quite low, meaning that in order to get into the chamber, people would have had to stoop.

At the front of the cairn, framing the entrance to the chamber, is a flat or gently-curving *façade* that acts to define the forecourt. This *façade* can end in points, as seen at **Monamore**, or as square-ended horns, as seen at East Bennan on Arran. The façade stones can sometimes be imposing and graded in size, as in the case of the 'proto-Clyde cairn' at **Cairnholy I**, where the gaps between the uprights were filled with neat drystone walling.

The edge of the cairn was defined and retained by a kerb of upright stones and / or drystone walling, and further chambers can occasionally be found subsumed within the body of the cairn, or as lateral chambers opening towards its sides, as seen at Gort na h'Ulaidhe. In some cases, a chamber can be seen at the rear of the cairn, as seen at Giant's Graves, which also displays traces of a rear façade.



A Clyde cairn under construction. ►

The chambered cairn of Auchoish in Argyll survives as a spread mound of stone, its forecourt and rear chambers just about visible amongst the rubble. Although much disturbed, this Clyde cairn has many distinct similarities to the court tomb of Annaghmare in County Armagh.

The square-ended horns of East Bennan on Arran clearly define its forecourt. The long chamber has five compartments divided by *septal slabs*. Ailsa Craig is visible in the distance.

Court tombs

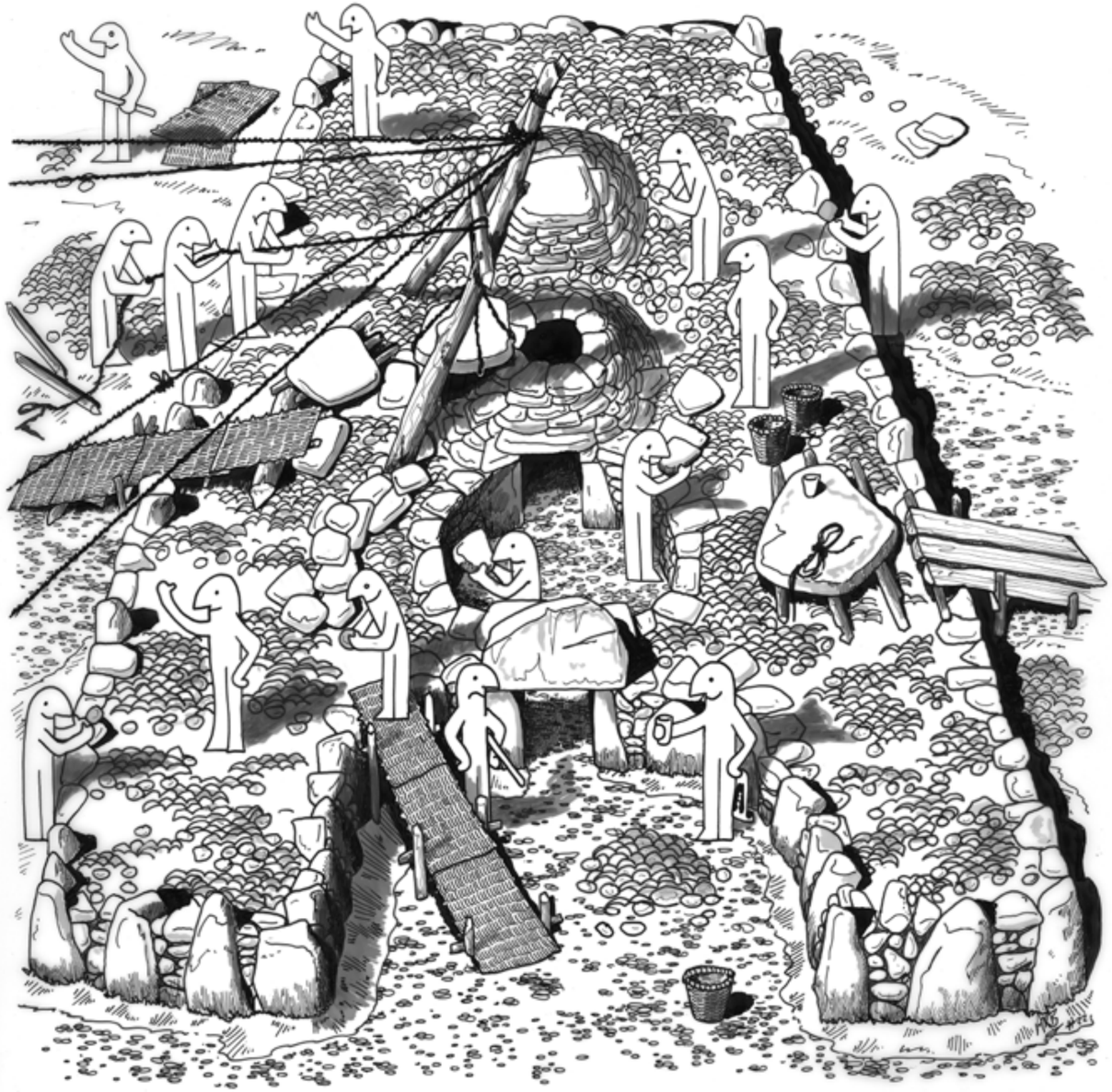
There are over four hundred court tombs recorded in Ireland, with a most being found in the northern third of the island. Although court tombs have several variations in layout, most examples comprise a substantial cairn of stone and earth that is rectangular or trapezoidal on plan, enclosing a segmented gallery consisting of between two and five chambers set within the body of the cairn. The galleries were roofed by large flat *capstones* laid across the *orthostats*, or by *corbelling* springing from the sides; and were segmented by pairs of upright *jamb stones*, or by a combination of *jamb stones* and *sill stones*. The cairn was retained by a kerb of upright stones, with or without drystone walling.

At the front of the cairn, framing the entrance to the gallery, is a curving *façade* that acts to define the forecourt, and usually takes the form of square-ended horns. “Those monuments with a two-chambered gallery and with an open court appear to be the basic court tomb type;” notes archaeologist John Waddell, “most of the other varieties being more complicated variations on this plan” (2022, 69). The well-preserved court tomb of **Creggandevesky** in County Tyrone is a classic example, with open court and a gallery with three chambers.

Variants on the design of court tombs are known, some with clear regional distributions. In one such variant, the horns of the forecourt extend to enclose the court fully; these are known as full court tombs, and they are found in north-west Ireland. In these cases, the narrow entrance to the court was usually opposite the entrance to the gallery, as seen at **Creevykeel**.

A note on terminology

In Scotland, the terms ‘chamber’ and ‘compartment’ are used to describe the internal space and its division, while in Ireland the terms ‘gallery’ and ‘chamber’ are used. We have retained both terminologies and use whichever is appropriate to the site being discussed.



A court tomb under construction. ►
© Alan Braby

Antynanum in County Antrim has the longest cairn of any court tomb, measuring at least 60 m from NE to SW. In this vertical aerial photograph, you can see the curve of the forecourt (top right) outside a long and narrow two-chambered gallery, and the *capstone* of a ruined portal tomb can be seen towards the far end (bottom left). The size and shape of this cairn is very similar to the long cairns of eastern Britain.

The court tomb of Clontygora in County Armagh has been largely robbed away to build the surrounding stone walls. It probably comprised a large gallery with three chambers, the first of which retains its huge *capstone*. The impressive forecourt still retains many large *orthostats*. An excavation in 1937 recovered cremated bone, pottery, flint artefacts and a polished stone axehead of porcellanite.

Occasionally there are two unroofed courts, set at either end of the cairn and facing outwards; these are known as dual court tombs. The galleries can be independent of each other, as seen at **Audleystown** in County Down, where each gallery has four chambers; or shared, as seen at **Aghanaglack**, where the two galleries of two chambers each share one back stone. Very occasionally, the unroofed oval court is placed centrally, with galleries extending into each end, as seen at **Ballyglass** in County Mayo and **Magheraghanrush** in County Sligo; these are known as central court tombs and, like full court tombs, they are found in north-west Ireland. In these examples the entrance to the court is situated to one side, perpendicular to the entrances to the galleries. Occasionally, a court tomb will have subsidiary chambers set at the rear of the cairn and opening towards its sides, as seen at **Annaghmare** in County Armagh, where excavation has suggested that the subsidiary chambers were added after the initial construction of the cairn. Very occasionally, a court tomb will have twin chambers set side by side; only two examples are known, at Magheraghanrush and **Cloghanmore**, both in north-west Ireland.

Both Clyde cairns and court tombs often seem to have featured stretches of drystone walling between the *orthostats* of their *façades* and chambers, acting to hold back the cairn material and level upwards to support *capstones* and *corbels*. However, many cairns and tombs have suffered considerable disturbance, and the shape of their forecourts, the number of their chambers and the style of their roofing is often only discernible following excavation.

An extensive re-examination of the available excavated material from Irish court tombs has enabled a detailed programme of radiocarbon dating to be carried out. This established a timeframe that suggests their initial construction to be around 3700 – 3570 BC, and the indications for Clyde cairns are that they are likely to have a similar date, starting 3765 – 3645 BC. However, we should not imagine that they were all built at the same time: in any given landscape there would have been tombs in various stages of construction, from clearings with the buzz of building and all the comings and goings of partially built structures, to fully built and functional tombs and older long-established tombs.

◄ **The court tomb of Annaghmare in County Armagh has a gallery with three chambers divided by *jamb stones*, and two subsidiary chambers set at the rear of the cairn and opening towards its sides.**

Monumental tasks

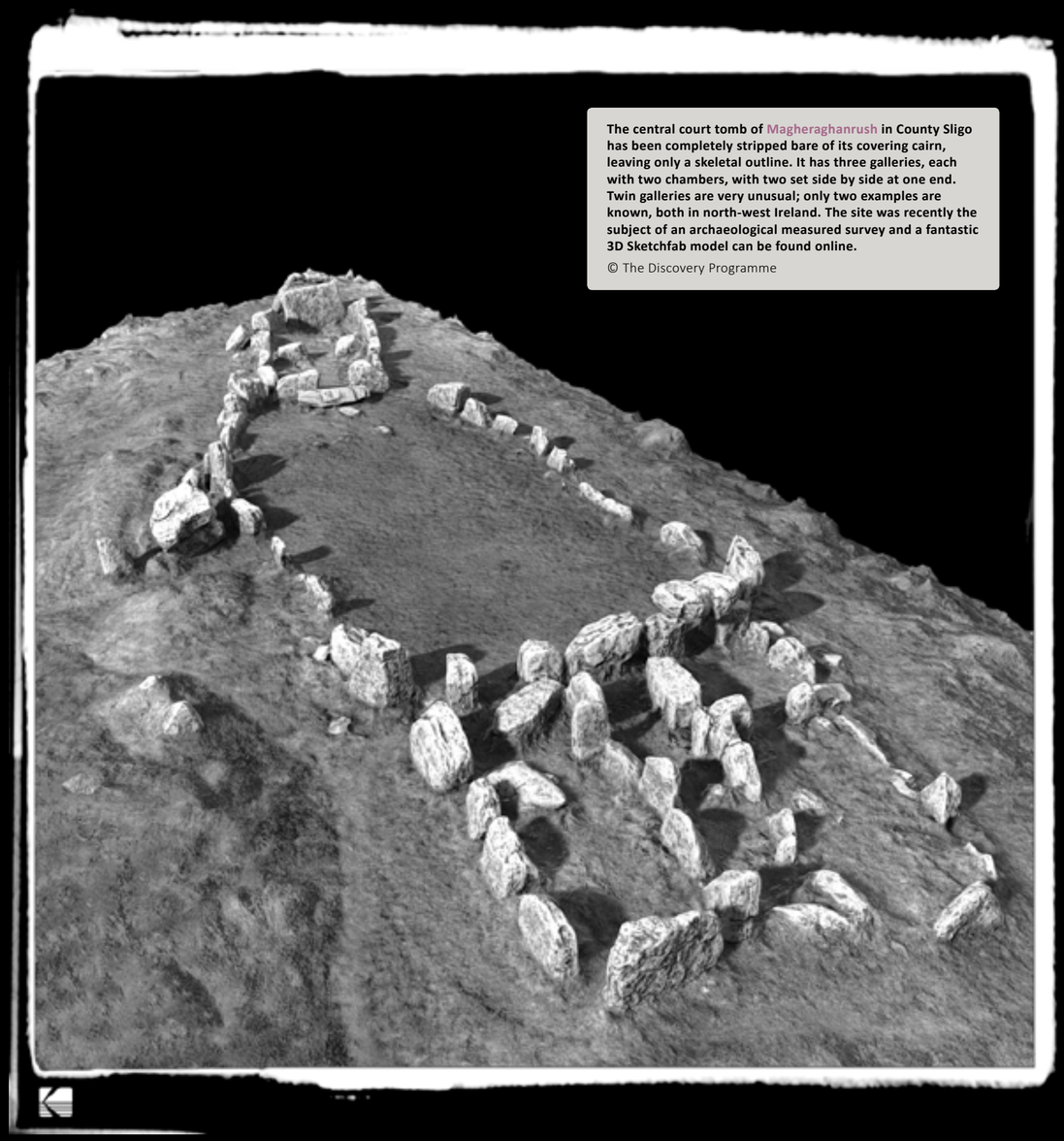
Writing on the typological study of chambered cairns – of their different sizes and shapes and various architectural quirks – the archaeologist Kenny Brophy noted that “the ways that we think about chambered cairns may have focussed too strongly on only limited elements of these monuments [on morphology, size and material culture]. For these were monuments that were the focus of various forms of ritualised practice and many different social and individual emotions, and were certainly far more than the sum of their constituent parts” (2005, 9). Basically, by defining tombs with typological labels, archaeologists may be overlooking the unique differences that reflect what each individual monument meant to the community who built and used it. He continues, noting that “Neolithic constructional processes did not involve the repeated building of similar sites to preconceived plans, but rather may have revolved around elements of social memory and cherry-picking known motifs and elements of earlier sites” (2005, 10).

In studying a chambered cairn, consideration should also be given to landscape location, construction techniques and questions of temporality (any different phases of use and changes or development over time). Neolithic monuments “were organic locations that grew and changed with the seasons,” Kenny muses, “that were embellished, cleaned and merged with nature. They were and are locations that embodied the biography of their builders, users, spectators and excavators” (2005, 10).

This idea that each chambered cairn is unique is an attractive one and emphasises the important (and relatively intense) act of construction itself. “At such enduring construction sites”, observes the archaeologist Vicki Cummings, “the performance of people, the engagement with place, and the manipulation of materials would all have been powerful in the creation of memories and socialities in the Neolithic” (2016, 46). In short, *building* the tomb may have been more important than *using* the tomb – and this use may in any case have changed over the years.

However, while the builders of each site may not have been following an exact blueprint, there are clear similarities. How do we explain these similarities in concept and construction? While the builders may or may not have intended their construction to have such a lasting physical presence, and the seemingly absolute permanence of these monuments may have been a largely unintended consequence, each chambered cairn clearly acted as a marker in the landscape – a place to remember.

◄ **The dual court tomb of Audleystown in County Down has two independent galleries, each with four chambers. It was only discovered in 1946 and was excavated in 1952. The remains of thirty-four people were recovered.**



The central court tomb of Magheraghanrush in County Sligo has been completely stripped bare of its covering cairn, leaving only a skeletal outline. It has three galleries, each with two chambers, with two set side by side at one end. Twin galleries are very unusual; only two examples are known, both in north-west Ireland. The site was recently the subject of an archaeological measured survey and a fantastic 3D Sketchfab model can be found online.

The full court tomb of Cloghanmore in County Donegal was described as a "a ruinous pile of chambers and galleries" when it was discovered in the mid-nineteenth century, with the *corbels* of its chambers stripped away. The Office of Public Works reconstructed the cairn in the 1880s. It has twin chambers set side by side like those at Magheraghanrush.

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Creggandevesky ‘82

INSPECTORS OF HISTORIC MONUMENTS **VICKY GINN** AND **RONAN MCHUGH** INTERVIEW ARCHAEOLOGIST **CLAIRE FOLEY** ABOUT HER EXCAVATION OF THE WELL-PRESERVED COURT TOMB OF CREGGANDEVESKY IN COUNTY TYRONE

After the last Ice Age in Ireland, lowland raised bogs slowly began to develop in the valleys, and blanket peat began to cloak the uplands, particularly when the weather got a bit cooler and wetter from around 1200 BC. This peat growth has played a significant role in the preservation of large numbers of prehistoric monuments – from *megalithic* tombs and stone circles right down to clearance cairns, nestled within whole field systems. The peat grew over earlier landscapes, hiding them from view.

And so it was when archaeologist Claire Foley arrived to begin the rescue excavation of a site at Creggandevesky, she found only a large heap of stones with peat and heather grown over the edges. Claire described the site as “just an unassuming low cairn with some large stones peeping out from the collapsed cairn material. The farmer who owned the site wanted to level his land for grazing,” she explains, “and the legislation at the time allowed only for a short period of notice before he went ahead. We planned at the outset to completely excavate the cairn.”

The excavation took place over four summer seasons between 1979 and 1982. As the covering loose stones were carefully removed, a well-preserved trapezoidal cairn was revealed underneath, with an open court facing to the south east, and containing a gallery with three burial chambers stepping down in height from front to back. “The cairn was originally retained with a drystone wall which survived to over a metre high in places,” Clare continues, “and this wall was protected by the collapsed cairn material which extended for several metres out on each side. This indicates that the cairn may have been more than two metres high when it was first built. The survival of so much of the cairn material in its original position is unusual as it is usually robbed out for field boundaries in recent centuries.”

The entire court area had been filled with collapsed cairn material, due to either natural cairn collapse, which Claire believes, or deliberate blocking when the tomb was abandoned. The trapezoidal entrance *lintel* sits squarely on a pair of ungainly portals and is levelled up by a remarkable, surviving, small chocking stone. It is clear that the original builders wanted the *lintel* to sit level, to make a major architectural entrance statement, so they found this expedient solution during the building to stop the *lintel* from sitting crooked. The scarcity of boulders in the local glacial deposits was supplemented in the court area by ‘post-and-panel’ building, where *orthostats* were spaced apart and the areas between were filled with drystone walling.

◄ **The excavation of Creggandevesky.**

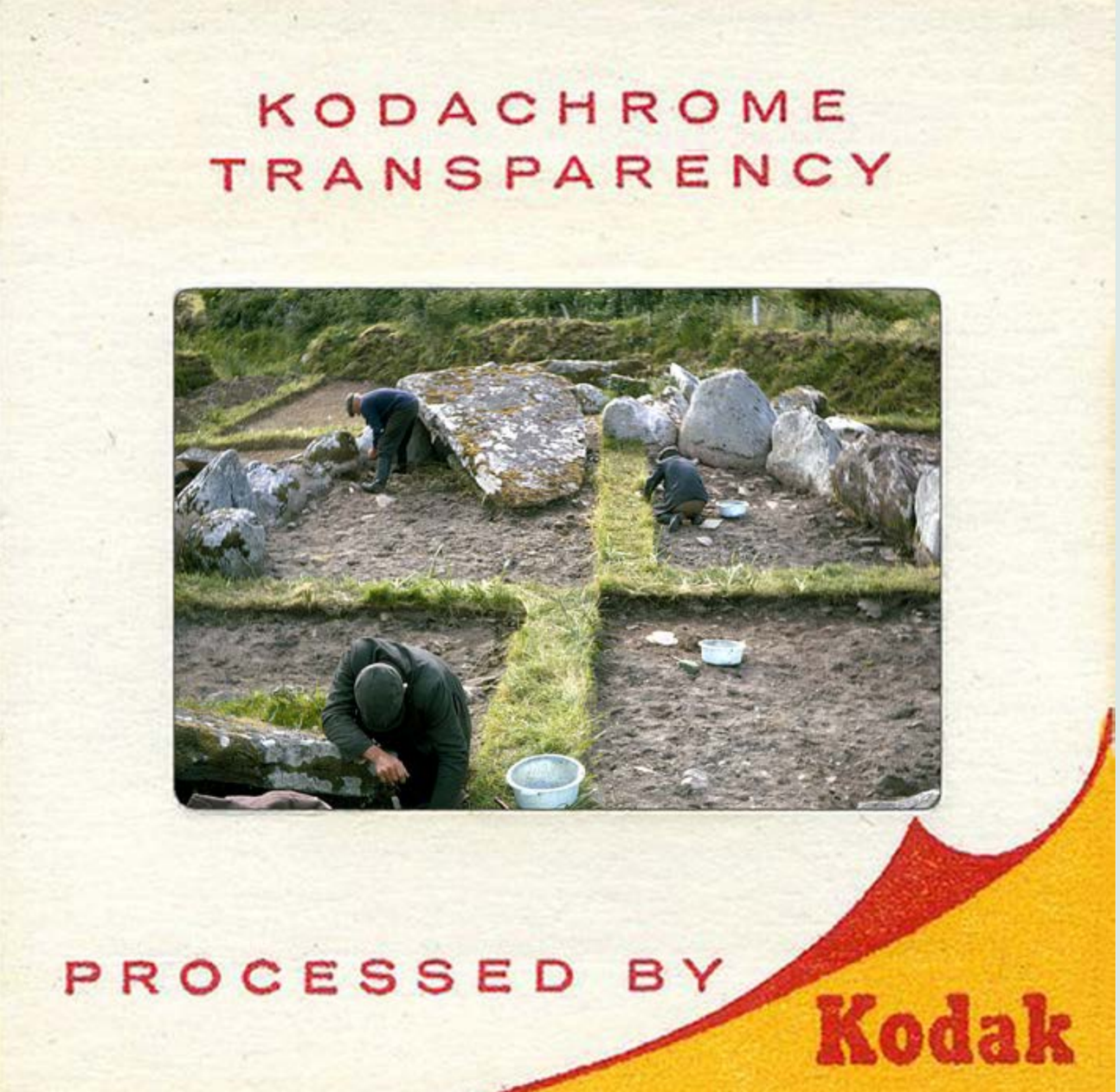
The burial gallery had been roofed with *corbels* which remained around the edges, pitched at about 45 degrees, and the final layer were sandstone slabs, remains of which were found collapsed into the chambers. Based on the angle of the *corbels*, the ceiling of the first chamber is estimated to have been about two metres in height. This first chamber would have been easy to stand up inside.

Most of the burial evidence from the tomb suggests that only samples of the cremated remains of some 22 people were interred here. This suggests that the tomb was used for a considerable period of time, with the remains of new bodies being added as time went on. These were principally in the first chamber accompanied by Early Neolithic Carinated Bowl pottery, flint arrowheads, flint tools and a disc-bead necklace or bracelet made from shale – this last most likely to belong to a later, Early Bronze Age phase of re-use. The central chamber had some fine artefacts, including an arrowhead made from non-local black chert and three flint arrowheads, as well as Early Neolithic pottery, but no bone was found. This suggests that some unburnt remains had dissolved away in the acidic soil conditions.

The site overlooks Lough Mallon, one of several small lakes in the area, and was probably deliberately placed here for spiritual reasons, designed to face into the mid-winter rising sun. "The tomb probably lay open for hundreds of years," Claire concludes, "and the court area may have been used for important ceremonies for families and communities, rather as churches are used today. It was still recognised as a burial site in the Bronze Age, when further cremations were placed on top of the cairn collapse. The tomb was venerated by successive communities long after it was built."

Hidden by the peat and the collapsed cairn material, Creggandevesky was not immediately recognisable as a court tomb in 1979. Threatened with removal in an agricultural reclamation scheme, the rescue excavation revealed it to be in an almost perfect state of preservation below roof level. The owner changed his mind about clearing it, and the site came into state care in 1984.

Creggandevesky in County Tyrone was just a featureless mound when it was excavated between 1979 and 1982. After stripping away the peat, the archaeologists found a court tomb in an almost perfect state of preservation, with a court leading to a gallery with three chambers under a short trapezoidal cairn of granite boulders. The largest stone is a massive *lintel* over the entrance from the court to the gallery. The cairn's drystone side revetment walls still stand to some height and some of the *corbel* stones of the roof were still in place. Thin sandstone slabs found inside the chambers suggest that the roof was completed with these finer stones.



Ballyglass ‘69

ARCHAEOLOGIST **JESSICA SMYTH** FROM UNIVERSITY COLLEGE DUBLIN DESCRIBES THE EXCAVATION OF AN UNUSUAL CENTRAL COURT TOMB AT BALLYGLASS IN COUNTY MAYO, RECENTLY PUBLISHED WITH THE SUPPORT OF THE ROYAL IRISH ACADEMY

Ballyglass is one of only eight known central court tombs in Ireland. It was excavated over three summer seasons between 1969 and 1971, the work directed by Seán Ó Nualláin, Archaeological Officer to the Ordnance Survey of Ireland. The first season of excavation revealed a cairn mainly consisting of small sandstone slabs with some larger granite boulders and defined by a kerb of sandstone. Artefacts from this cairn included Early Neolithic pottery and stone tools (known as lithics) from the Neolithic into the Bronze Age as well as a glass bead of Later Bronze Age date. The central court was defined by *orthostats* of granite and sandstone, with a possible area of paving identified at the entrance to the western gallery. Lithics, especially scrapers, were found in this central court, but no other artefacts. The eastern and western galleries running off the central court were each divided into two chambers.

In contrast to the central court, the tomb galleries appeared to have been the focus for significant depositional activity. Finds included Neolithic and Bronze Age pottery as well as cremated bone, some identifiable as human, and some as animal. In both galleries, the presence of paving and elaborate stone-lined or stone-capped pits seems to show the importance of the inner chambers. Modern crockery, iron and lead fragments were also recovered from the gallery deposits, indicating considerable later disturbance. While the cairn contained Early Neolithic lithics and pottery, there was no pottery from the Early Neolithic recovered from the galleries or court. Instead, Middle Neolithic material was common, including from the pits in the gallery chambers. The tomb was clearly reused throughout prehistory, and certainly in the Early and Late Bronze Age, with Beaker pottery in the front chamber of the eastern gallery and Late Bronze Age coarse ware in the front chamber of the eastern gallery and in the back chamber of the western gallery.

In later seasons of excavation something unexpected began to emerge: the footprint of a rectangular timber house, measuring 13 m by 6 m transversely, clearly underlying the cairn and kerb of the tomb. The house belonged to a very recognisable style of timber architecture built and used in early 4th millennium BC. It was defined along three sides by a continuous slot trench with associated postholes. Charcoal from the postholes and wall trenches were identified as oak and hazel with some willow or poplar and indicated a mix of sturdier post and plank construction with some lighter structural elements.

◄ **The excavation of Ballyglass.**

Domestic spaces are defined as much by function as by form, and there is ample additional evidence for the Ballyglass house functioning as a 'house of the living'. Pottery sherds representing up to 18 Early Neolithic Carinated Bowls were recovered from the foundation trenches, postholes and the area outside the house. These pots were certainly used for processing food: carbonised matter and sooting from the cooking fire was visible on a number of exterior and interior surfaces, while organic residue analysis has detected dairy fats in the vessel walls of these pots.

The small lithic *assemblage* is also characteristic of house sites: a few fine re-touched pieces such as leaf-shaped arrowheads and a plano-convex knife with some tool maintenance and use but few cores and little production evidence. In the eastern end of the house, fire-reddened areas of clay were revealed alongside a dense charcoal deposit. This may indicate the presence of a hearth, although the charcoal deposit appeared to radiate outwards from the wall and could also be the burnt remains of structural timbers or wattle screens. Episodes of intense burning are not uncommon in Irish Early Neolithic houses and arguments for accidental or deliberate burning can vary from site to site.

Might this evidence for burning be linked to deliberate destruction of the house? Postholes in the house seemed to have been deliberately filled with stones and soil, presumably after the posts had been removed, with some postholes covered by a layer of daub. Ó Nualláin concluded that the house was intentionally demolished to make way for the tomb, but the large number of Irish Early Neolithic houses excavated since the early 1970s show that deliberate acts of destruction or decommissioning are common. Intense burning, dismantling and infilling, the digging of pits and purposeful deposition occurs on many house sites that were never later covered by a *megalithic* monument, so these traces at Ballyglass may be instead connected to the normal lifecycle of the house.

However, the presence of a 'classic' Early Neolithic rectangular timber house underneath a court tomb is – so far – unique within the archaeological record. In turn, the layout of the overlying court tomb is very unusual, with two galleries running in opposite directions from the central court. This design has been argued to represent a local community built around an alliance between two distinct or unrelated lineages. We may never know if this really was the case, but it certainly seems that Ballyglass was a particularly special 'place to remember'.

Taking five during the construction of a central court tomb. ►

A place for the living

"The idea that tombs should play an integral part in the activities of the living is something which we are not particularly familiar with today"

(Clarke *et al*, 1985, 16.)

"The story of the Neolithic period in Britain as we so far understand it," wrote archaeologists Keith Ray and Julian Thomas, "has been compiled from myriad individual archaeological encounters with the traces of human activity from the centuries concerned in different places within the landscape" (2018, 99). They went on to describe 'the remains of earth-fast timber structures', 'areas of burning where hearth-fires had been laid', 'spreads of decayed material from rubbish dumps and middens' and 'pits dug and backfilled', each a chance encounter that can be scientifically analysed and perhaps radiocarbon dated. If you add to this mixture the study and investigation of all of the artefacts and monuments that survive, with repeated observations and interpretation, it is possible to create a chronological narrative of the Neolithic.

However, it can be difficult to bring life back to the story, to add colour to the picture. To do so we need to use our imagination, weaving a *narrative interpretation* to clothe the bare bones of the past. The cairns of the North Channel were built by people and communities with beliefs and traditions that were very different from those we practise today. How best to imagine the sights and sounds of these tombs for the dead and the ceremonies that once took place in their forecourts?

Were tomb gatherings small family affairs, large communal ceremonies, or both? Were the tombs themselves dark and forbidding, occasional places that lurked at the fringes of daily life, stale, unkempt and forgotten until they were needed? Or were they familiar places, carefully and reverently tended, celebrated and embraced with a central role in the daily lifecycle of the community?

Not all of the surviving chambered cairns will have been in use at the same time – as the early Neolithic period progressed, some tombs will have fallen out of use just as construction will have yet to have begun on others. Who was responsible for commissioning a tomb, overseeing its construction and determining its use? Was there a role in society for the Tomb Keeper as we imagine here, part master-of-ceremonies and part front-of-house? Could the more complex dual, full or central court tombs indicate a larger caste of tomb keepers, or more exclusive burial ceremonies, hidden from view within the enclosing arms of the court?

Creative Activity: Tomb Keepers

Drawing inspiration from sacred places that the learners have experienced for themselves – or perhaps learned about of other cultures from around the world – imagine the next stage in the story of Uri and Ani as they bring the bones of their grandmother to rest in the tomb.

A young girl and boy are travelling with their mother and uncle. They carry a decorated wicker basket within which are the bones of their grandmother. They are travelling in a dugout canoe – a boat hewn out of a single vast oak trunk, and decorated with the symbols of their kin group. This is the children's first long journey – they all take turns to help paddle the heavy canoe. They hug the shoreline before turning to cross the deeper waters of the firth. They have never met their island kinfolk; they are excited, and also a little afraid. As the group approach the island, the landscape before them changes. The fresh salt air and big open skies of the coast are joined by grey and jagged mountain peaks. Their mother has made this journey before and she tells them of the settlements, sacred places, forests and mountains that they pass. As they journey along the changing coastline of the island, their mother and her brother recount the story of how their parents met at a great feast long ago. Their grandfather was from the mainland and their grandmother was from the island.

As the little group climb the path up to the cairn they pass through ancient woodland full of gnarled and twisted trees hung heavy with lichen and moss. They cross streams by carefully stepping from rock to rock, and pause to rest when they need to, looking out over the sea to the coastline in the far distance. They must reach the cairn before sunset, to meet with the tomb keeper and prepare for the ceremony. As they emerge from the woodland onto the heather moorland they begin to hear rhythmic chanting and see the light dancing from an open fire. They had reached the stone tomb of their ancestors, a founding family from whom their grandmother had been chosen to travel further, and who was now returning home. The tomb keeper opens his arms in welcome. "Come my children," he cries, "it is time to begin."

What does the Tomb Keeper have in store for them? What happens inside the forecourt? Learners could write the next chapter, or take inspiration from our comic strip and draw the next page. They should base their work on the archaeological information that they have gathered so far, and on any chambered cairns that they have visited during the course of their studies.

The treatment of the body

Dealing with the remains of the dead could be a skilled, complex and drawn out process, whether out in the open upon some form of platform, or hidden away within the chamber of a tomb requiring careful orchestration. Just as in modern western society we recognise the distinct skillset of the professional funeral director in preparing the body for burial and presiding over the funeral ceremony, so too we imagine Neolithic communities to have had select members who maintained and wielded funerary knowledge. For our family group who have just crossed the North Channel, Winta, Goraid, Uri and Ani, this is the Tomb Keeper who greets them and leads them through the funeral ceremony and burial of their (grand) mother's remains. In this reimagining, our Tomb Keeper also performs roles held by priests in some ancient societies, holding a special status to enter the tomb, watch over the interred remains, and take responsibility for placing, moving, sorting or removing them.

The act of cremation involves a range of different opportunities for the living to interact with the recently dead, from the exertion of building the funeral pyre and the emotion of watching it burn, to the intimacy of carefully picking through the ash to gather the fragments of bone that remain. "Cremation is a powerful experience," write archaeologists Kenny Brophy, Gavin MacGregor and Gordon Noble, "one that generates memories and impacts on the body [of the living] as well as on the mind" (2018, 88).

Similarly, the act of inhumation also involves a range of different opportunities for interacting with the dead: there are various degrees of decomposition possible, with a fully excarnated body (with all the flesh gone) simply being one end of the spectrum. Decomposition is also a powerful experience!

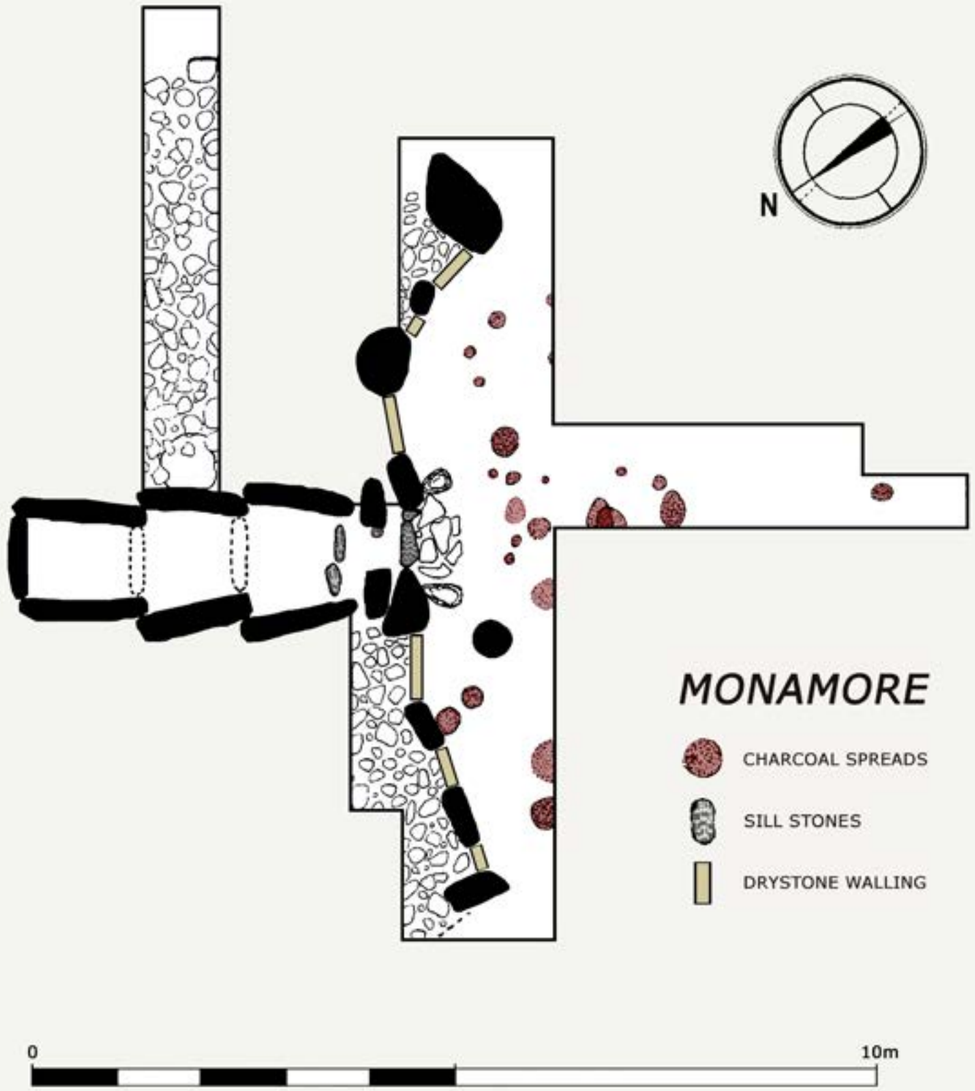
Uri and Ani carry their grandmother's remains in a decorated wicker basket, which tells us that the body has already been reduced to bones ether by decomposition or cremation. They will have witnessed funerary acts and ceremonies associated with these processes in their homeland which will have created lasting memories; now they continue towards the end of the journey and a final ceremony to leave perhaps only a few carefully selected bones in the place of their ancestors.

The role of fire

As with so many aspects of Neolithic life, fire played a significant functional, ceremonial and spiritual role in the journey of a person passing from life to death. We understand the role of fire in cremation but what about its wider use as part of funeral ceremony? Fire can have many metaphorical associations and symbolic meanings: with life, providing heat and light; with transformation, changing the appearance, taste and energy value of food; and with death, consuming living things and turning them to ash. It's quite easy to imagine Neolithic society making similar associations and although archaeology may not be able to fully explain the subtleties of meaning that fire had to those who grieved, celebrated and remembered the dead, it offers us clues for our imaginations to work with.

Excavations at **Monamore** in 1961 discovered twenty one distinct spreads of charcoal, and a further three thinner scatters, in the forecourt of the cairn. Another patch was found just inside the entrance. There can be little doubt that each represents the debris of a small fire lit in the forecourt. **Cairnholy I** is another example where archaeological excavation has revealed evidence of forecourt fires, where five small fires were deliberately set. Evidence of a sixth, much larger fire was also discovered directly opposite the entrance to the chamber in a place where a standing stone had been removed. Fragments of jewellery, pottery and the charred remains of food are sometimes found amongst the charcoal of these forecourt fires. Fire clearly had an important role to play in the practices, ceremonies or gatherings that took place in the forecourts of the chambered cairns.

An imagined ceremony at Cairnholy I in Galloway. ►



Objects and grave goods

Individual grave goods – possessions or gifts interred with an individual – are very difficult to identify. Objects in themselves are not absent from chambered cairns, but those which are recovered from excavation often appear to relate more to the activities of the living than belongings of the dead. The most common objects found include pots (usually broken), flint tools and animal bones. Some of these objects may have been placed inside the tomb with an individual, but many may have been left inside the chamber following activities that are not directly linked to burial, such as revisiting and cleaning the tomb, rituals linked to the gods or ancestors, or leaving joints of meat or food in pots as offerings for the dead.

However, more interesting objects can be found, such as the fragment of a ceremonial polished stone axehead in Alpine jadeitite found in the *antechamber* at **Cairnholy I**, or the polished stone axehead of porcellanite found within the gallery at **Clontygora** in County Armagh, perhaps an offering or a grave good. Two porcellanite axeheads were found placed within the earth at the full court tomb of **Creevykeel**. One was placed at the entrance to the court and another was placed at the entrance to the inner of the two chambers, perhaps ritual depositions associated with the monument itself.

◄ **Excavation at Monamore on Arran in 1961 revealed a complete crescentic *façade* of eight *orthostats* separated by dry-stone walling. Twenty-one distinct spreads of charcoal, and a further three thinner scatters, were recorded in the forecourt of the cairn. Another patch was found just inside the entrance. There can be little doubt that each represents the debris of a small fire lit in the forecourt.**

The porcellanite axehead

EXPERIMENTAL ARCHAEOLOGIST **JAMES DILLEY** FROM ANCIENT CRAFT DESCRIBES HIS JOURNEY TO THE MOUNTAIN OF TIEVEBULLIAGH IN NORTHERN IRELAND TO FIND THE SOURCE OF PORCELLANITE

There are a variety of Irish stone types used in the Neolithic to make axeheads, but the two best-known materials are flint and porcellanite. Flint can be found on the coast around much of Ireland, but it *outcrops* around the Antrim coast in Northern Ireland, which is where the larger blocks can be found. Porcellanite *outcrops* in Northern Ireland at just two locations, at the mountain of Tievebulliagh and on Rathlin Island.

In the Glens of Antrim, the mountain of Tievebulliagh ('the hillside of the booleying' or summer grazing) is a jagged line of hard igneous stone. It was created by a volcanic plug of basalt lava and olivine-dolerite that caused contact-metamorphism to form mullite-cordierite-corundum-spinel hornfels, also known as porcellanite. As well as Tievebulliagh, another source was utilised in the Neolithic for quarrying porcellanite. The small island of Rathlin off the north coast of Northern Island has striking white and black cliffs where basalt lava overlies flint-bearing chalk. One of the many volcanic *outcrops* on the island has a band of porcellanite that was quarried into resulting in small caves.

Why did people choose to use this rock over others? It is likely there is a combination of reasons, but one is that it can be flaked predictably like flint. So why didn't people just use flint? While axeheads made of Antrim flint do exist and were exchanged outside of Ireland, flint is quite brittle. The material used to make an axehead will have to withstand repeated, hard shock on a thin edge. If that material is too soft it would crumble and not hold an edge. If the material is too hard and brittle, it can shatter. Past research has found that in the British Neolithic, people favoured materials other than flint for axeheads because it tended to last longer. Axeheads from famous so-called 'axe factories' such as Great Langdale in Cumbria

© Emma Jones / Ancient Craft

or Graig Lwyd in Gwynedd have been found hundreds of kilometres from their source, while flint axeheads tend not to be found as far away. Porcellanite falls into the sweet spot of being hard enough to flake predictably (like flint), but not so hard that it can be brittle (again like flint). That slightly softer characteristic also means it is quicker to polish smooth.

To obtain a usable block of porcellanite, people would have needed to clear the rock face and begin chipping away ledges that could be used to strike off large chunks, or provide an access point for wooden levers and wedges. Its possible people used fire to heat and then shatter the rock with water, but this would also potentially damage the stone that they were seeking. Once a block had been detached, it could be flaked with pebbles in the same way as flint. The edges would have been struck to utilise the *conchoidal fracture* to remove flakes from both sides. The rough block would have changed shape into an elongated lens that was probably finished with antler

hammers that could detached long, thin flakes. Skilled knappers probably worked alongside their apprentices, and it's possible to recognise finely made axehead shapes (known as roughouts) and flakes from attempts made with less experienced hands.

When the site of Tievebulliagh was first recognised and researched in the 19th century, antiquaries found and removed many hundreds of discarded roughouts from the foot of the hill. Today, around 7,500 finished porcellanite axeheads from Northern Ireland are known. To produce this many axeheads would have generated an enormous amount of waste flakes (known as debitage) and discarded or broken roughouts. We don't know whether the local community had a monopoly of the porcellanite that they then traded for other goods, or if people travelled to the *outcrop* to make their own. But Tievebulliagh and Rathlin were just as important as the other 'top' axehead-making sites in the Neolithic. It is perhaps fitting that another translation of Tievebulliagh is the 'hillside of the striking'.

Porcellanite axeheads have been found in many parts of Britain, including as far away as Shetland, and they are the commonest type of stone axehead in Ireland. While on paper these locations seem a great distance from the 'Hillside of the Striking', when standing on the top of Tievebulliagh at 402 metres Ordnance Datum (OD), on a clear day you can see over the North Channel to Galloway, where porcellanite axeheads have also been found. It's clear the sea was no boundary to Neolithic people.

The Blasthill Bowl

ARCHAEOLOGIST **ALISON SHERIDAN** DESCRIBES HOW THE DECORATION ON A SMALL POTTERY BOWL CAN TELL A TALE OF ANCIENT MIGRATION AND INTERMINGLING TRADITIONS

During their excavation of the multi-phase Early Neolithic chambered cairn at Blasthill on the southern tip of Kintyre in 2009, archaeologists Vicki Cummings and Gary Robinson found the remains of a small, fine-textured, beautifully decorated pot in and near the outer compartment of what is believed to be the earliest part of the monument. The pot may be small, but the story it has to tell about the ceramic tradition to which it belongs, and about cultural interactions within western Scotland, and between Scotland and north-east Ireland, is hugely important.

Just over half of the pot survives; further sherds may remain in the unexcavated part of the chamber. However, enough is present to show that this had been a closed bipartite bowl – a bowl divided into an upper part and lower part by means of a fairly sharp carination (change of slope), and with an upper part that slopes inwards. It has an out-turned rim, a gently convex upper part and a fairly deep, rounded belly. The rim diameter is 120 mm and its height is 105 mm. The wall thickness ranges from just 4.75 mm at the rim to 7.9 mm at the carination. It has a fine fabric which is a light, slightly reddish-brown on the exterior surface, the same colour and a light greyish brown on the interior, and medium to dark grey at its core. The interior of the pot had been scraped to make the wall as thin as possible, and on the underside of the rim there are indentations made by a spatula-like tool, used to give it its crisp shape.

◄ **This example of an Early Neolithic decorated bipartite bowl, whose design ancestry goes back to Breton pottery, was found during excavations at Blasthill on Kintyre. The distinctive rainbow motifs and the other designs were created by impressing a curved piece of whipped cord into the wet clay. A fantastic 3D Sketchfab model can be found online.**

A detail from the Blasthill bowl showing the distinctive rainbow motif.

Much of the exterior surface is decorated with impressions made by pressing tightly-whipped cord into the surface of the pot before the clay had dried. Above the carination is a design featuring rainbow motifs (made using four nested arcs), interspersed with sets of vertical lines (of which the complete example has 13).
There were probably four of each of these motifs, running around the circumference of the bowl. Also present just above the carination are occasional curving 'maggots'. These 'maggots' continue over much – but by no means all – of the pot's belly, running around the area immediately below the carination and extending down to its round base (or just above) in a fairly random way, with occasional straighter or hockey-stick-shaped 'maggots' just below the carination. Part of the belly is blank, and while the decoration extends down nearly to the rounded base, the base itself is undecorated.

Presenting such a detailed description of the pot is very important, because it is a very rare example. It is instantly recognisable as of a type of pottery that ultimately originated far away, in the Morbihan region of southern Brittany. The bipartite shape, the 'rainbow' design and the fringe just below the carination are key design elements of so-called Late Castellic pottery in Brittany – a style in use there between around 4300 BC and around 3900 BC. Indeed, it is possible to reconstruct a ceramic 'family tree' for the evolution of this style of pottery in western and south-west Scotland and Ireland. A classic example of a Late Castellic bowl was found in a Breton-style simple passage tomb at **Achnacreebeag** in Argyll. This small, thin-walled, fineware bowl has the characteristic rainbow and fringe motifs, made not by impression but by incising the design with a sharp tool, according to the Breton tradition. The fringe consists of short vertical lines.

The Blasthill bowl can be regarded as a ceramic 'descendant' of the Achnacreebeag bowl, clearly belonging to the same stylistic tradition but differing from it in its method of decoration and in details of its design. Other 'descendants' of the Achnacreebeag bowl have been found in Clyde cairns in south-west Scotland, for example at **Beacharra**, further up the Kintyre peninsula, and at **Clachaig** on Arran. They have also been found in court tombs in north-east Ireland, such as at **Ballyalton** in County Down, and this sharing of such a distinctive type of pottery shows how close were the connections across the North Channel. Indeed, in Ireland it is possible to trace the ceramic 'descendants' yet further in time and space, down to single-person graves in eastern and south-east Ireland dating to around 3500 BC.

The examples found in Clyde cairns and court tombs are likely to date to around 3750–3700 BC. What of the date of the Blasthill bowl? On the one hand, its sherds were found above those of the lugged pot that has produced a date of 3630–3360 BC from burnt-on organic matter. That pot is likely to have been deposited after the monument had been converted into a Clyde cairn by the addition of a trapezoidal cairn. On the other hand, the contents of the chamber were heavily disturbed, and a fragment of burnt hazelnut shell produced a much earlier date of 4040–3790 BC, so it is possible that the pot dates to the early fourth millennium and had been moved from its original position. Sadly, the pot at Achnacreebeag cannot be dated, but by analogy with its counterparts in Brittany, a date very early in the fourth millennium seems likely.

The Breton origin of this distinctive type of pottery reminds us that some of the earliest farmers in Scotland came from Brittany, sailing north along the Atlantic coast and up the Irish Sea, arriving around or shortly after 4000 BC. Other early farmers, who ended up in south-west Scotland, had their ancestors in the Nord-Pas de Calais area of northern France. West and south-west Scotland was a region where the descendants of these two different strands of settlers from France intermingled. We can see this in the fact that a pottery style that was initially associated with Breton settlers, and was buried in a Breton-style passage tomb, was then adopted by people of north French descent who built monuments in a different style.

The Clyde cairn of Blasthill on Kintyre survives only in outline. ►

© Alan Braby

A place for the dead

"The adult human skeleton is made up of over two hundred bones, and each has its own story to share"

(Sue Black, 2020, 3).

Chambered cairns were built for communal and not individual burial, although it seems that not everyone in the community got to be buried there (or if they did, they did not stay there permanently). The people buried in chambered cairns became, over time, the ancestors of the living community, and the monuments allowed their commemoration in a way more akin to that seen with a war memorial than a family vault; "it is in these terms of a continuing and explicit reflection of the dead with the power to communicate across the generations that such monuments must be viewed" (Clarke et al, *Symbols of Power*, 1985, 17). In the case of monuments featuring a timber mortuary structure (**Lochhill**, **Slewcairn** and **Dooey's Cairn**), it may well be that the few people buried there were regarded as members of the communities' founding families – the monuments were memorials connecting their builders to the lineages of and kinships with the pioneers who first settled the land. In other monuments, which were accessed for successive *interment* and bodies were added over time, the individual identity of the dead people became subsumed within a communal identity as their remains became mingled with those of other people.

The living related to these dead people inside the monuments in various ways, sometimes rearranging their bones or even removing some, depositing offerings of food or drink for the dead in the forecourt or elsewhere, and probably carrying out rituals designed to communicate with the dead. The ancestors may have been venerated or feared, or regarded as protectors or judges of the living.

There have been over one hundred years of archaeological investigation of chambered cairns in Britain and Ireland. Countless excavations of sites up to 6000 years old – ancient ruins that have all usually been cleared out and disturbed at some time in the past. "There is evidence to suggest that the deposits found inside the chamber may have been cleared out or pushed to one side on many occasions before the final deposition was made," noted the archaeologist Graham Ritchie, "and of course this last is the one that remains for archaeologists to excavate" (1997, 68).

The osteoarchaeological record includes big bones, small bones, bits of bones, tiny fragments of bones, burnt bones and bits of burnt bones. Issues of preservation must also be considered: burnt bone survives for longer than unburnt bone. It is never an easy task to pick through an *assemblage* and present a complete picture of its contents – and it is always likely that the *assemblage* represents only an incomplete picture of the people who were once *interred* within the monument.

Cremation has been used by humans as a funerary rite to dispose of a dead body for over 11,000 years. Burning a dead body is still used today by many different cultures around the world (although using many different methods). Neolithic cremation involved a body being burnt on an open-air pyre of wood. The resulting ashes, or sometimes just selected bone fragments, could be collected and ceremonially placed somewhere meaningful, such as within a tomb or beneath a cairn. Alternatively, bodies (or body parts) could become cremated when a timber mortuary structure was burnt down.

Inhumation is the oldest funerary rite used by humans, and simply involves burying (inhuming) the dead body. A Neolithic inhumation could look very similar to modern burial practices, with a complete dead body *interred* in a tomb and allowed to decompose out of sight. However, another Neolithic inhumation practice was excarnation, where the body was left in the open to decompose; specific bones could then be chosen for *interment*.

Osteoarchaeological analysis of large Neolithic burial *assemblages* from sites across North West Europe suggests that there were very high infant mortality rates. The average age of death for women was in the mid-20s, and for men it was in the late 20s and early 30s. Of course there would have been older people, and some individuals lived beyond 50. Short generation spans, the frequent death of children, crop failure and poor harvests, illness, injury and inter-personal violence would have all conspired to make death a constant companion.

"The treatment of the body after death in the Neolithic" noted the archaeologists Penny Bickle and Emilie Sibbesson, "is extremely varied across Europe and within individual regions and cultures, and rarely were human remains simply buried without further intervention or being subjected to secondary burial rites" (2018, 3). Within chambered cairns in general it seems that cremated remains could be placed individually or in mixed deposits, while bodies were usually *interred* whole and allowed to decompose. The skeletons were then disarticulated and their bones moved around the chamber and mixed up with the bones from other bodies. When the bones can be identified with any accuracy, it is clear that both sexes and all ages are represented: men, women and children, young and old.

Human osteoarchaeology

Human osteoarchaeology is the scientific analysis of human skeletons recovered by archaeological excavation. It can tell us about the health, lifestyle, diet, mortality and physique of people in the past. It may also be able to help us identify genetic relationships and the movement of people. Techniques used by human osteoarchaeologists range from visual examination, through the measurement of bones and teeth, to chemical and physical analyses.

Analysis of the *assemblage* from the court tomb of **Audleystown** in County Down found that the four chambers contained the remains of thirty-four individuals, both male and female and of all age groups. Some of the bones were cremated, and some were unburnt. These bones were buried in groups, sometimes neatly arranged, but not as entire skeletons. They were disarticulated when buried, and had been defleshed before being interred. These unburnt remains were also accompanied by cremated and scorched bones.

Excavating at the Clyde cairn of **Torrylin** on Arran in the early 1900s, the archaeologist Thomas Bryce found the skeletal remains of at least six adults and two children. They were not laid out as individual skeletons but were found in a jumbled mass of bones. The bones of one individual were found all over the chamber: "the long bones lay chiefly along the walls of the cist [chamber] in great confusion. The skull was placed down, and tilted somewhat on its right side… an *ulna* [one of the two bones of the forearm] lay on one side, a *humerus* [the upper arm bone] on the other" (Bryce 1902, 83). However, the bones were not necessarily all that jumbled – the skulls lay in the corners of the chamber and the long bones along its sides – and it was clear that some had been removed. It could be argued that preservation or excarnation rites could account for some of the missing bones, but in most excavated chambered cairns *assemblages*, it is some of the largest parts of the human body (and those most resistant to decay) that are missing.

The amalgamation of disarticulated human bones into an ancestral grouping is significant – what they represented must have been just as important as who they represented, and the removal of bones from the chambered cairn must have been just as important as their original deposition. These ritual practices suggest that the tombs were seen as *ossuaries* and the bones themselves became *human relics*, representative of the ancestors rather than of the individual.

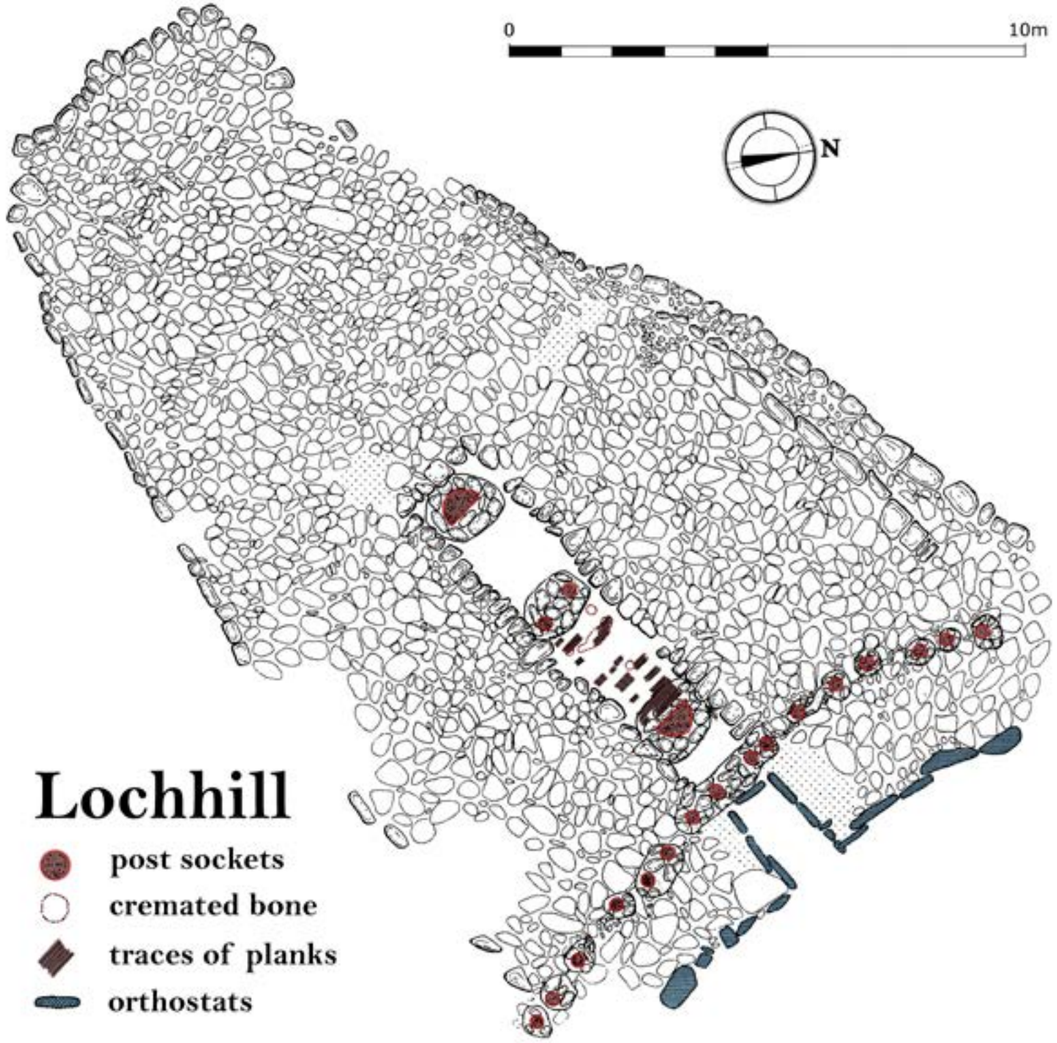
Lochhill ‘71

ARCHAEOLOGIST **ALISON SHERIDAN** DESCRIBES THE EXCAVATION OF TWO IMPORTANT EARLY NEOLITHIC SITES AT LOCHHILL AND SLEWCAIRN, RECENTLY REVISITED WITH THE SUPPORT OF FORESTRY AND LAND SCOTLAND, THE PREHISTORIC SOCIETY AND GLASGOW ARCHAEOLOGICAL SOCIETY

Around 5700 years ago, on two hillsides south-west of Dumfries, not far from the northern shores of the Solway Firth, Early Neolithic farmers built timber mortuary structures to house and memorialise the remains of certain members of their communities. Sometime later – we can’t say exactly how long, but it could have been a matter of only a few years – they burned these down and covered them over with stone cairns faced with a *façade* of upright slabs. Later still, probably around 4500 years ago, people blocked up the entrance to each of these monuments and left offerings of pottery to mark the occasion. In the much more recent past, other farmers saw the cairns more as a handy supply of stone than as sacred monuments, and they removed many of the stones, rearranging some of them, at Slewcairn, to form lambing pens. And it was in that dilapidated state that they stood when, in the late 1960s and 1970s, that they were excavated by the late and much-missed archaeologist Dr Lionel Masters.

Lionel had moved to Dumfries in 1966 when he joined the Department of Extra-Mural and Adult Education at Glasgow University. He was a dedicated advocate of teaching professional archaeological skills and had a passion for prehistoric cairns – no doubt enhanced by the publication of Audrey Henshall’s magisterial study of Scotland’s chambered cairns in 1963. Thus inspired, Lionel decided to explore two nearby monuments, starting in 1969 with Lochhill. Both this excavation (1969–71) and that of Slewcairn, under 6 km away to the south west (1973–81), were carried out on a shoestring budget of just a few hundred pounds each year.

Lionel and his team of volunteers and students undertook a total and meticulous excavation of each monument, documenting the process carefully, making detailed notes and plans, and taking hundreds of photographs. Both monuments had initially just looked like large, low, roughly oval, grass-covered heaps of stones, each measuring around 25 m in length and up to 15 m in width. However, when the team started to excavate, they discovered that the cairns had been trapezoidal in shape – and that they had been constructed over the remains of earlier monuments made of timber. These mortuary structures had each been made by splitting the trunk of a sizeable oak tree, nearly a metre across, then setting the D-shaped halves at either end of a rectangular space and constructing what had probably been a planked platform between them, resting on posts set mid-way between the end posts, and protected by a flat roof made from birch bark. At Lochhill they also erected a timber *façade* (and possibly a stone porch) in front of this chamber, while at Slewcairn, a paved area bounded by two standing slabs was created behind the chamber.



This plan of the proto-Clyde cairn of Lochhill has been annotated to show the main features of the timber mortuary structure that was found beneath the cairn. The three postholes contained the remains of two split timber posts, one at each end, and two smaller posts in the middle, the post sockets supported by packing stones. The traces of oak planks and deposits of cremated bone are also marked, as are the postholes remaining from a curving *façade* of posts that was erected at one end. The plan of the later cairn shows the various phases of walling that were recorded: the *orthostats* that were erected to form a new *antechamber* and *façade*, and the line of walling that deliberately enclosed the burnt remains of the timber mortuary structure. The stones that overlay the timber mortuary structure and the timber *façade* are not shown.

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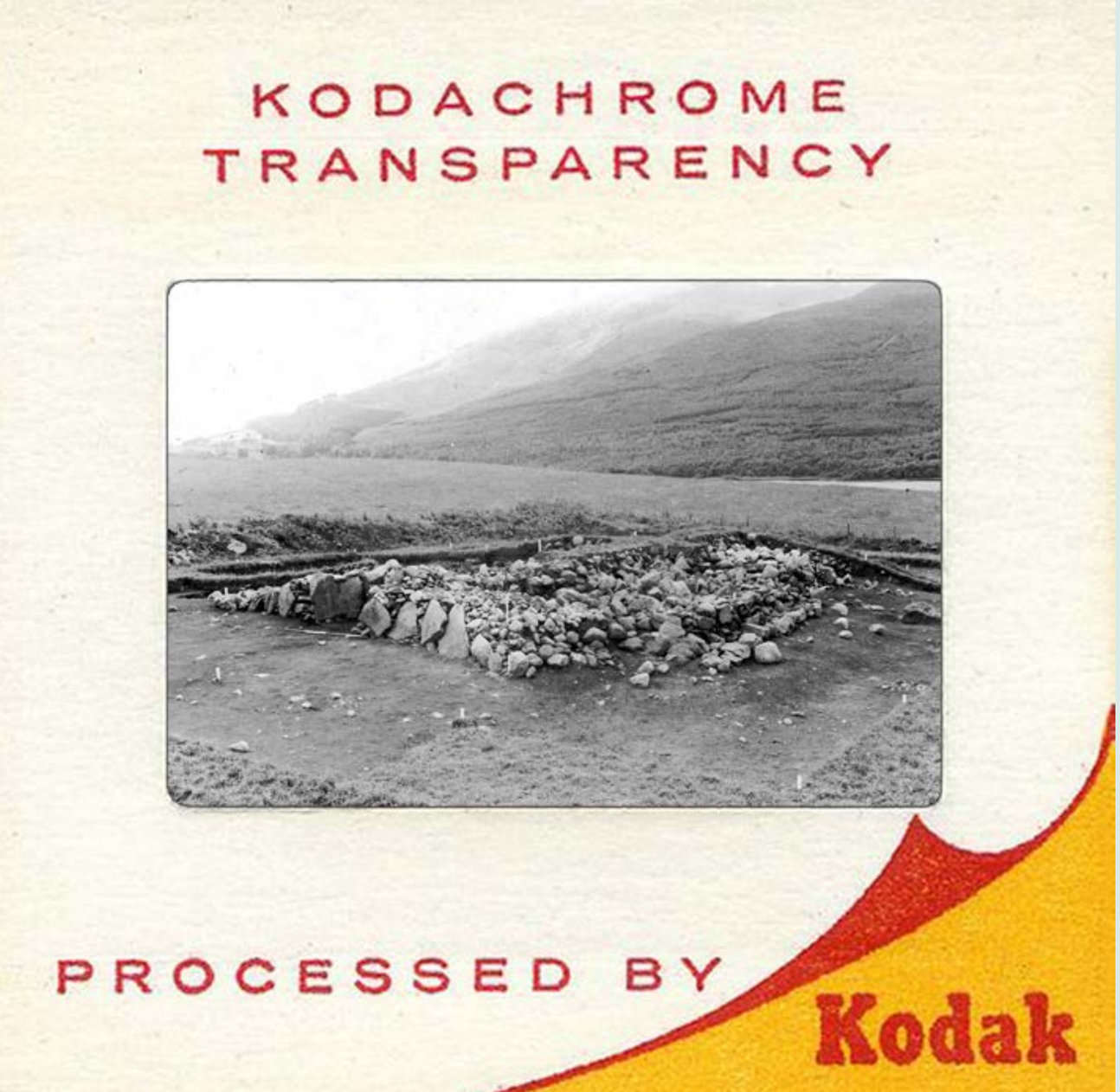


The remains of dead people were placed upon the structure (perhaps, at Slewcairn, after having been left to decompose partially on the paved area) and offerings for the dead were placed in pots. Thereafter, the timber structures (and *façade*) were burnt down; stones were thrown into the pyre while the embers were still hot; and low walling was built around the 'footprint' of the space, as the trapezoidal cairns were constructed over the whole of each monument, sealing in the cremated remains of the dead.

The subsequent structural history of each site was carefully documented by Lionel. At the end of the excavations, there was no money to restore the cairns to their former appearance, and so the heaps of stones were left close to where they had once stood – where they remain to this day. What's more, while a little post-excavation analysis was undertaken, there were no funds to allow all the necessary 'post-ex' work and publication of the full excavation reports to go ahead. The only publications about these very important Early Neolithic monuments were an article on Lochhill in the journal *Antiquity* in 1973; annual summary updates in *Discovery and Excavation in Scotland*; and a popular article in *Current Archaeology* magazine in 1972.

There things were left, and in April 2019 Lionel sadly died. After his funeral I promised Lionel's wife Margaret that I would get these projects completed, and with the assistance of a crack team of specialists the work has been progressing excellently. A suite of eight new radiocarbon dates has been obtained, proving that the timber chambers were built around 3700–3650 BC. Angela Boyle's osteological work has confirmed the presence of the partial remains of one adult male at Lochhill, and of seven people – men, women and children – at Slewcairn, raising important questions about exactly what was done with people's bodies. Work continues – we hope to undertake isotope analysis of the cremated remains – and many new insights are emerging. It is a testament to Lionel's skill as a field archaeologist that these legacy projects are able to be brought to fruition some 40 years after he finished digging.

◄ **The excavation of Lochhill.**

Inside the laboratory

OSTEOARCHAEOLOGIST **ANGELA BOYLE** DESCRIBES WORKING ON THE CREMATED BONES RECOVERED FROM THE SLEWCAIRN AND LOCHHILL TIMBER MORTUARY STRUCTURES, EXCAVATED IN THE 1970S AND NOW BEING RE-EVALUATED

It is the physical remains that bring us closest to the lives of Neolithic people – and any excavation of a chambered tomb or funerary monument will involve an osteoarchaeologist at some stage, whether during the excavation itself or during post-excavation analysis in the laboratory.

Ideally, an osteoarchaeologist would be involved in the initial stages of any archaeological project where human remains are likely to be revealed. This will ensure that appropriate methods are put in place for excavation and recovery. However, this is not always possible for a variety of reasons, most notably in the case of unexpected discoveries, and human remains are often received after the completion of excavation.

This is why it is important for the osteoarchaeologist to understand the details of the archaeological excavation prior to analysis. The cremated material or inhumation remains may have been disturbed as a result of post-depositional (or *taphonomic*) processes in the soil, the methods of archaeological excavation and the techniques of post-excavation analysis. All of these factors will have an impact on the data that can be recovered during analysis.

The focus here is on cremated human bone. A standard set of procedures are employed to facilitate the recovery of information which allows us to consider a range of questions in a methodical manner. The cremated bone should normally have been cleaned by wet sieving down to a mesh size of 1 mm. Material other than bone from the 5 mm fraction and above will normally be removed at this stage.

The first step in analysis is to obtain the total weight of the cremated material using digital scales. When combined with the measurement of maximum fragment size this provides an assessment of bone fragmentation. Every fragment of bone is then examined at least once, no matter how small it is. This is because identifiable material may be present among the smallest sieve residue. For example, teeth survive well though crowns and roots come apart from each other, and the enamel of the crown often shatters into very small pieces.

During examination, all identifiable bone is separated into four skeletal areas: skull (including mandible and dentition), axial skeleton (clavicle / collar bone, scapula / shoulder blade, manubrium, sternum / breastbone, ribs, vertebrae, sacrum and pelvis), upper limb (humerus, radius, ulna, wrist and hand), and lower limb (femur, patella, tibia, fibula, ankle and foot). All identifiable material is weighed and bagged separately in case further analysis is required at a later date. The total weight of a dry skeleton is approximately the same as that of a cremated skeleton. However, the collection of cremated bone from pyres was usually selective, and only some of the material was recovered for burial.

Sometimes animal bone is incorrectly identified as being human during excavation. This is often because bones are incomplete or poorly preserved. At this stage human and animal remains would be separated.

◄ **These fragments of cremated bone are almost exclusively from the skull of a probable adult. They were recovered from the remains of the timber mortuary structure found under the proto-Clyde cairn of Slewcairn near Dumfries in 1974.**

The next step in analysis is to look for duplicate elements which may indicate the presence of more than one individual. Diagnostic elements such as the pelvis and the skull are then examined to make an assessment of the age and sex of adult remains. Non-adult remains are not generally sexed. Age estimates are then attempted using a range of indicators. Age ranges are usually broad due to the nature of the material. For example adult is defined as more than 18 years old, and non-adult is defined as less than 18 years old. Measurements can assist in age and sex estimation. These are taken with sliding callipers.

The cremated bone is then examined for evidence of pathological lesions indicative of disease, trauma and poor health. It is very unusual to be able to determine cause of death.

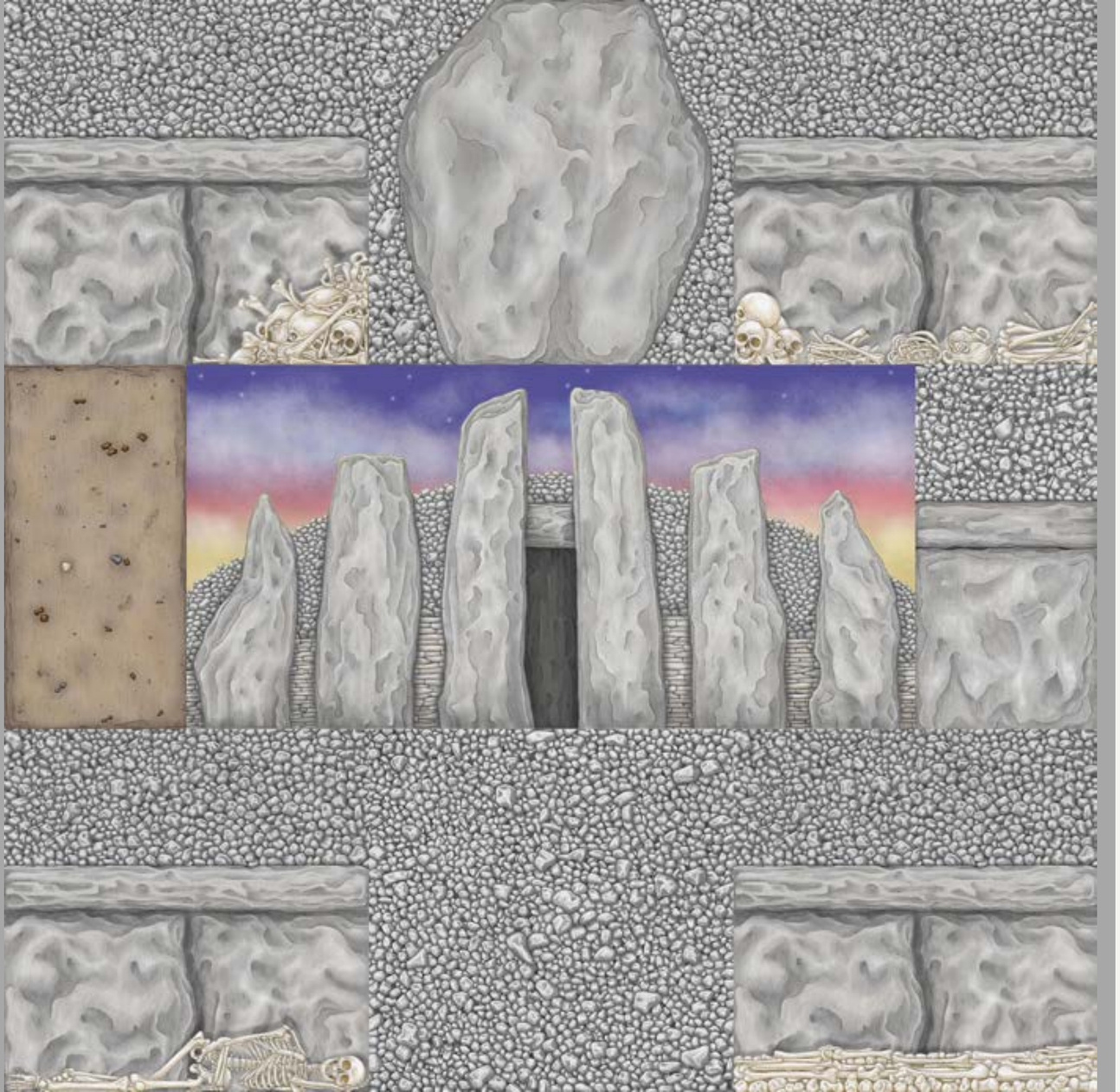
An important aspect of analysis is the recording of the colour of the cremated bone which is a reflection of oxidisation, related to the temperature of the pyre and its effects on the bone. Colour is an indicator of the efficiency of the cremation process and is linked to factors such as the quantity of fuel used, the temperature reached and the length of time that the pyre was burning. The thoroughness of cremation of the corpse on a pyre is very dependent on elevated temperatures being sustained for at least 7 to 8 hours. This often requires tending the pyre and adding fuel during the conflagration which represents considerable use of time and resources. Bones that are brown / orange and black are charred fragments that have been burnt in temperatures up to c. 300°C. Bones that are shades of blue-grey are incompletely oxidised, indicating temperatures of up to c. 600°C. Most cremated bone is fully oxidised and white in colour, indicating temperatures greater than 600°C. Dehydration during cremation can lead to shrinkage and warping of the bone along characteristic patterns. These are recorded, as are any abnormal variations.

Analysis of cremated bone from the timber mortuary structures at **Lochhill** and **Slewcairn** has identified both similarities as well as interesting differences. The total weight of the material from Lochhill is 220 g. Investigations in modern crematoria have found that the average bone weight of cremated adult individuals ranges from approximately 1000 g up to 2400 g, with an average of 1650 g. Therefore, it is clear that this deposit comprises only a very small proportion of the complete burnt skeleton. Identifiable fragments are skull, mandible and long bone shaft. Axial elements are absent as are bones of the hands and feet. All the bone is white and well oxidised indicating that the cremation process was efficient. Analysis of the skull indicates that the remains are those of an adult male.

Analysis of the cremated bone at Slewcairn is ongoing. The total weight of the material is greater than at Lochhill, although again most of the bone is white and well oxidised indicating the efficiency of cremation. To date, seven individuals have been identified. In contrast to Lochhill, it would appear that all skeletal elements are represented at Slewcairn.

The analysis of cremated bone presents a specific set of challenges, although there is potential for recovery of information related to the process of cremation. The main analytical focus is on the 'osteobiography' of the cremated individual(s) – the personal stories that can be found within the bones. The osteoarchaeologist asks who was buried here and why? Can we shine any light on the lives they led?

The excavation of Slewcairn. ►
© Lionel Masters



◄ **The Very Archaeological Cut Outs #6: the model tomb.**
© Vicki Herring

Analytical Activity: Bone Detectives

The following activity puts learners in the role of osteoarchaeologists – bone detectives – examining the bones found within a Neolithic chambered cairn. The aim is to analyse the *assemblage* from the tomb to work out how many individuals were buried and what the bones can tell us about their lives and deaths. Along the way, learners will be following similar processes and applying similar ways of thinking to osteoarchaeologists, offering an insight into an archaeological career pathway, and demonstrating the problem solving and critical thinking skills that lie at the heart of all archaeological work (as well as the analytical skills of the bone specialist).

What is excarnation, cremation and inhumation? What bones usually survive? Skulls and long bones? Ribs and hips? Charred fragments? What can they tell us about the past? How were they placed in the tomb? What are their diagnostic features?

The 'Bone Detectives' activity presents learners with the task of unjumbling a selection of cremated and unburnt bones (such as skulls and long bones) in order to work out approximately how many individuals are in the *assemblage* of a fictional tomb they are excavating. There are four different *assemblages* for learners to excavate, provided as four sets of 24 cards each. The activity is designed for groups of between 4 and 6 learners, and emphasises the importance of teamwork. The activity Assemblages get progressively harder: while lots of clues are provided as notes on the Assemblage 1 and 2 cards, Assemblage 3 and 4 cards have no clues (although the information is also included within the **bone recording form**). For larger numbers of learners divided into multiple groups, it is recommended that everyone tackles the same Assemblage level at the same time, beginning with Assemblage 1. For educators keen to run two Assemblages in tandem, it is possible to undertake Assemblage 3 as an entry level activity alongside Assemblage 1.

Educators are encouraged to bookend the activity with concept and context discussion, as well as interweaving concept expansion and explanation during the activity. This could be done effectively by pausing the activity between each step to contextualise what has been completed and explain the next step. Further consolidation will also fit well in a concluding reflect-and-report exercise as learners share the findings from their bone analysis. Educators can draw from the preceding archaeological discussion sections within this resource, the 'Inside the Laboratory' feature, the bone recording form and the learning points outlined under each step of this activity guide.

Print and carefully trim each section. Choose two side panels and tape them to opposite sides of the earthen base of the chamber, facing inwards. Then tape the end panel to the base and the side panels. Fold along the top of each *orthostat* to form the top of the chamber. Print three cairn material sections and tape these to the panels to widen the sides of the cairn. Tape the *façade* onto the chamber to form the forecourt. Place the *capstone* on top of the chamber to finish.
© Matt Ritchie

Assemble the tomb

To begin, print sufficient copies of the **bone cards** and **tomb model** so each group of learners has a set of cards and their own tomb. You'll need to assemble the stylised tomb model together in the classroom; it works best when printed onto card. The four side panels of the tomb chamber each reflect different burial traditions used in the Neolithic, all of which have been evidenced by archaeological excavation at different tombs. Building the stylised tomb model creates the ideal opportunity to talk about the four burial traditions depicted and described below, and of how the tombs were used. This in turn will help explain to learners how the bones of the individuals placed inside could be moved around and become come mixed up over the course of the tomb's use, resulting in the confusing jumbles of bones that archaeologists discover:

- **Pushed to back:** where earlier burials are just pushed to the back to make room; a mass of disarticulated skeletal remains comprising odd bits of multiple individuals.
- **Laid out neatly:** long bones and ribs laid out neatly in rows.
- **Ritual piles**: reordered and arranged, skulls to one side, leg bones to the other.
- **Laid out individual:** an articulated skeleton.

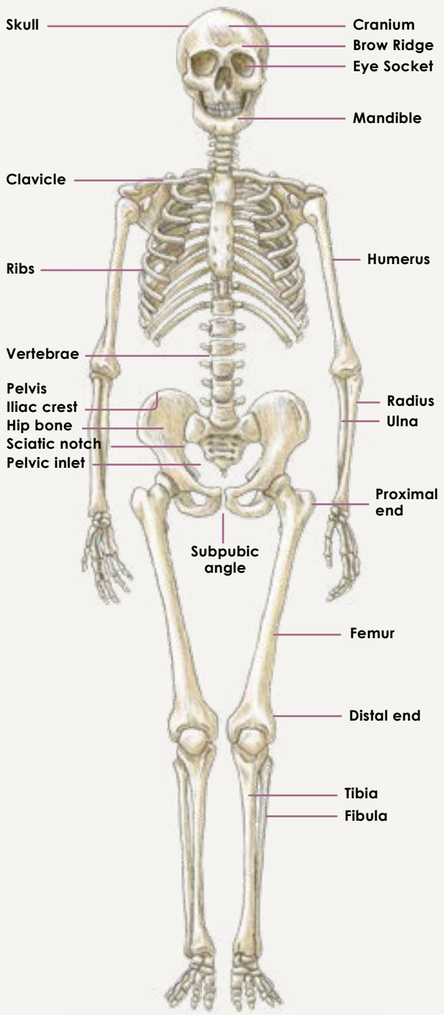
In the second part of the activity, learners explore the specialist job of the osteoarchaeologist by sorting the jumble of burnt and unburnt bones into as many individuals as they can.

Analyse the assemblage

Fill the chamber of each **tomb model** with a shuffled set of **bone cards** from the same Assemblage level (identified by a matching coloured border) – these represent the jumbled archaeological *assemblage* awaiting excavation. Print a **bone recording form** for each group to use. Just like archaeologists, writing down their observations will help the learners to make sense of the *assemblage* they are excavating. As well as providing a worksheet to record observations, the bone recording form serves as a workflow guide and knowledge toolkit for sorting the jumble of bones. Once their tombs are prepared, learners can begin their excavation and analysis of the remains. Working as a team and at their own pace, each group should 'excavate' all of the bone cards from inside the tomb and lay them out face up ready for sorting. They can now work through the following five steps to analyse their *assemblage* and identify any diagnostic features. In archaeology, diagnostic evidence is where distinguishing marks or characteristics survive that allow material remains to be identified or dated with a high degree of confidence.

The skeletal remains of several million people lie in underground catacombs beneath the streets of Paris, neatly arranged and packed tightly. The long bones and skulls were arranged to form walls behind which the other ones were piled. They were moved and reinterred from the city's overflowing cemeteries in the late 18th century. Similar smaller *ossuaries* can be found in Catholic churches and chapels across Europe. Although the sanctity of the human bones is respected, the identity of the individual is no longer important.

Bone Recording Form



Step 1: Cremated and inhumed remains

Sort your bone cards into cremated and inhumed remains. Set any non-human bone cards to one side.

ASSEMBLAGE

Step 2: Common bone types

Sort your human bone cards by type, looking for obvious clues like skulls and matching pairs of long bones. Count the number of cards of each type in your assemblage and write down the totals in the table. What is the estimated MNI (Minimum Number of Individuals) in the assemblage?

BONE	QUANTITY	
Skull		
Clavicle (left / right)		
Humerus (left / right)		
Radius (left / right)		
Ulna (left / right)		
Pelvis		
Femur (left / right)		
Tibia (left / right)		
Fibula (left / right)		
Small Bones		
Cremations		
MNI		

Start sorting your inhumed bones into individuals by laying out the skulls or skull fragments at the head of individual **skeleton columns**.

Step 3: Age at death

How old were the individuals in your assemblage when they died? Analyse all your bone cards for any age-related diagnostic information and sort your bone cards into piles by age. Note down how many individual ages you can identify in the table below, but don't add them up yet.
It may now be possible to match some of your aged inhumed bone cards with your **skeleton columns** of individual people. Remember, there may not be a skull / skull fragment for every individual, and you may have to start a new **skeleton column** without a skull. Some bone cards will be undiagnostic.

AGE	INHUMATIONS	CREMATIONS
Infant (age 1-12 months)		
Juvenile (age 1-12)		
Adolescent (age 13-17)		
Young Adult (age 18-25)		
Prime / Mature Adult (age 26-44)		
Older Adult (age 45+)		
Final MNI		

Step 4: Detecting the sex

How many male and female individuals are there?
Analyse all your bone cards for any sex-related diagnostic information and note down any clues.

SEX	INHUMATIONS	CREMATIONS
Male		
Female		

It may be possible to match your sexed inhumed bone cards with your **skeleton columns** of individual people.
Some bone cards will be undiagnostic.

Step 5: Preservation and fragmentation

Have any individuals suffered injuries? Do any individuals show signs of illness or disease?
Analyse all your bone cards for any diagnostic information and note down any clues.

INDIVIDUAL	INHUMATIONS	CREMATIONS

Complete the task of sorting and laying out your inhumed bone cards into the skeleton columns of individual people and go back to Step 3 to complete the table (remembering to include the information from the cremated material card).
What is the final MNI in the assemblage?

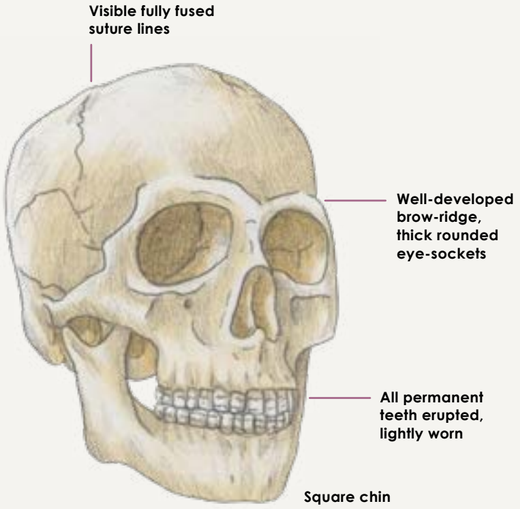
Analysing the Assemblage

What have you discovered about each individual? Use the data you have analysed to write your osteoarchaeological report.

Knowledge Toolkit

The suture lines on the top of the **skull** can provide a clue to age as they become less and less visible throughout adulthood. Teeth can also be useful indicators of age. Baby molars (back teeth) start erupting from age 12 months, and permanent teeth start erupting from age 5. Well-worn teeth indicate an older adult.

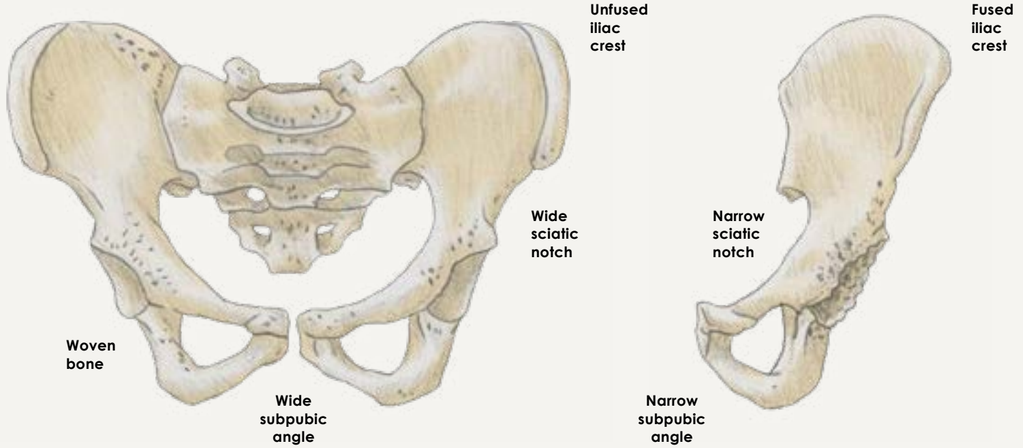
The **skull** is also really useful for sexing adult skeletons. A male **cranium** is often larger than a female with a wider **brow ridge** and thicker, more rounded **eye sockets**. A male **mandible** has quite a square chin whereas a female mandible is more pointed.



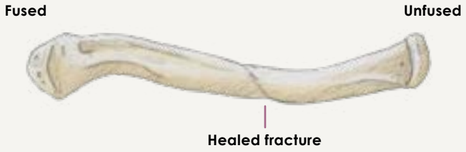
Bone fusing can also be a useful indicator of age. Fused bone describes edges that have joined together, and indicates that growth has stopped. Unfused bone describes edges that have not joined up, and indicates that growth is still happening.

- The lateral (arm) end of the **clavicle** fuses from age 18, medial (chest) end age 25+.
- The distal (lower) end of the **humerus** is fused by age 17, and both ends are fused by age 21.
- The proximal (upper) end of the **ulna** fuses from age 12, and both ends are fused by age 20.
- The proximal end of the **radius** fuses age 12-18, distal end fuses age 14-20.
- The ends of the **femur** are recognisable age 3-6 and fusing is complete by age 20.
- The fusing of the **tibia** starts in early teens: the proximal end fuses age 14-20, distal end fuses age 14-18.
- The ends of the **fibula** fuse age 14-20.
- The fusion of **pelvic** bones finishes around age 16-23.

The **pelvis** is also really useful for sexing adult skeletons as a female pelvis is wider for childbirth. The general rule is that all the key features of a female pelvis are broader (**sciatic notch**) and wider (**subpubic angle** and **pelvic inlet**) than a male pelvis.



The size of complete bones can also be a useful indicator of sex. A male shoulder and hip joint is usually bigger than a female, and a male **clavicle** is usually 15 cm or longer, while a female clavicle is usually shorter. The general rule is that in long bone lengths of the same type, male bones are larger with strong muscle attachments, while female bones are shorter with narrower bone shafts.



Bone can also provide lots of clues to injuries and disease.

- The **radius** is the most commonly broken arm bone, usually from a fall. It is common for the **tibia** and **fibula** to break together. Unhealed injuries usually suggest the most likely cause of death.
- Degenerative joint disease is most common in older age. For example, osteoarthritis is a joint disease often found in the hip, shoulder and knee.
- Woven bone forms as a response to infectious disease, and woven bone suggests an infectious disease caused death. Woven bone turns to lamellar bone when infectious disease heals.
- Dental Enamel Hypoplasia describes lines on the tooth surface which suggest a time of illness or malnutrition.

Step 1: Cremated and inhumed remains

The first sorting level is to separate the jumble of bones into cremated material and inhumed remains using the card titles and pictures on the face of the **bone cards** as clues. This is a key step in the analysis of disarticulated human remains. Any non-human bones should be placed to one side.

During Step 1, educators should endeavour to explain that there were two distinctive burial practices used in the Neolithic; rites that we still recognise and employ today. From their fictional *assemblages* learners will discover that real Neolithic tombs could contain a combination of cremated and inhumed remains or sometimes just inhumed remains. Neolithic cremation involved the body being burnt on a timber pyre, the resulting ashes collected and placed in the tomb. Alternatively, bodies (or body parts) became cremated when timber mortuary structures were burnt down. Neolithic inhumation could either see the body interred intact or left out to decompose (called excarnation) after which specific bones were chosen for placement in the tomb. Given the jumbled nature of tomb *assemblages* and the number of bones missing, archaeologists have traditionally viewed excarnation followed by selective bone deposition as the most common Neolithic burial practice. The data on the cremated material bone cards will help learners discover that small burnt bits of bone can actually tell us a lot about the individuals and the cremation process.

Step 2: Common bone types

The second level of sorting is to look at all the unburnt bones and organise them into piles by type using the bone names and pictures as clues. As they sort, learners should consult the annotated skeleton diagram on their **bone recording form** to get an idea of where these bones are located in the human body, roughly how many of each a person should have, and which way round they should go. On completion of this process, learners should have become more familiar with human anatomy and be able to identify the skull as the most obvious part of the skeleton of which humans have only one.

In producing the **bone cards**, we've tried to provide examples of the most common bone types found in cairn *assemblages*. The types vary considerably from cairn to cairn with preservation conditions playing a major part in what will survive. In some cases all parts of a skeleton will be represented by at least one example (there may be one rib, not all 24) but rarely will a whole adult human skeleton of 206 bones be found. In many cases it is concentrations of the larger or denser bones in the skeleton, such as the skull, pelvis and long bones from the arms and legs that are commonly found. These are also some of the most diagnostic bones for reassembling individuals and working out their age, size and height. Despite their small size, bones from the hands and feet are also quite common. Although numerous (there are 27 bones in each human hand), these bones are also fairly undiagnostic – they are very similar from one person to the next and don't tell us much about the person, making them hard to assign to a specific individual. As a general note, because the bones in cairn *assemblages* are normally disarticulated and mixed up, it is difficult to link individual bones conclusively, even diagnostic ones, to a single skeleton and the work often comes down to educated guessing. As they try to sort their jumbles of bones learners will discover that some bone cards are more useful than others, as there are both diagnostic and undiagnostic bones in each Assemblage.

Learners can try to predict how many individuals are present in their Assemblage. At a basic level this can be done by counting the number of skulls or skull fragment cards they have, then adding it to the number of cremation cards. For a more advanced estimate, learners can try to calculate the 'Minimum Number of Individuals' (known as the MNI). The MNI is based on a count of the highest number of duplicate bones in an *assemblage* (such as left femurs) and an assessment of any cremations. In most Assemblages there is more than one individual represented on a single cremation bone card. However, working out the number of cremated individuals may have to wait until the teams have learned how to read the clues for ageing and sexing. These are outlined for inhumations in Steps 3 and 4 and can also be applied to the cremated remains.

To finish Step 2, learners can start sorting their unburnt jumble of bones into individuals by laying out the skulls or skull fragments in a well-spaced horizontal line. These will become the heads of **skeleton columns** with other associated bone cards eventually being laid out below the skull cards.

Step 3: Age at death

In Step 3, learners will need to look for clues to divide the piles of **bone cards** that are currently sorted by bone type. First each pile should be separated into adult and non-adult bone cards. Once done, these bone type piles should be divided to form sets of cards of different types but with similar age ranges. This could begin with two sets, one of adult cards and one of non-adult cards and then these two sets could be divided into sub-sets following the categories listed on the **bone recording form**. On completion, learners will be a step closer to reassembling individual skeletons. As the sorting becomes more complex, the group may wish to allocate members to take responsibility for different age range sets (e.g. one learner looks after the older adult bone cards in front of them, another learner has young adult cards, another lines up non-adult cards).

Deciphering the bone card data is crucial to completing this activity. To make the process a little easier, we've provided notes on each card in Assemblage 1 and 2. These give learners the sort of specific knowledge that an osteoarchaeologist would have gained through their training and would use to decipher the clues on the bones. There are also some fun facts thrown in for interest. The knowledge presented is cumulative so as learners read and apply the hints on each card they will develop the skills needed to unjumble their piles of bones into individuals of different age and sex. Educators should encourage learners to carefully examine the notes on their cards so they know what to look for and compare with other cards of matching bone type in their Assemblage. Completing Assemblage 3 or 4 will require learner to apply the knowledge they've accumulated from the cards in the first two Assemblages.

Osteoarchaeologists can use a variety of clues to identify the age of an individual at the time of their death. This is because skeletons carry a range of good age indicators due to our bones and teeth maturing at fairly predictable rates. For toddlers to teenagers up to the age of 21, teeth are the most accurate age indicator as they develop and erupt along relatively standard timescales and sequences. Teeth are less useful for ageing adults as by 21 they have stopped erupting but they still hold valuable information about health, diet and lifestyle. Although heavily influenced by a person's life choices, the scale of dental wear and decay can offer a very rough indicator that the individual was getting *'a bit long in the tooth'*. At birth, the skeleton is only partially formed and throughout childhood the bones grow and parts of them fuse together at predictable rates. Growth normally stops between 17 and 25 years old so by measuring the length of the long bones and how well the ends are joined to the bone shafts can give an indication of the height (of adults only) and age of the individual. The size and shape of the skull and pelvis can also be age indictors. How tightly closed the suture lines on the top of the skull are also gives a clue to age as they become less and less visible throughout adulthood.

Our bones tell a story of the lives we've lived and what we put our bodies through. Diseases, infections, fractures and traumas leave lasting marks on our bones and if no evidence of healing exists, may even indicate a cause of death. Degenerative joint disease and osteoarthritis are the most commonly seen pathological conditions in Neolithic cairn *assemblages*. These often affect the hip, knee, shoulder joints and the spine. Joint disease is influenced by a range of factors including physical activity, occupation, workload and advancing age so the presence of osteoarthritis for example can be a good clue that the bone is from an older adult.

Towards the end of Step 3, the groups of apprentice osteoarchaeologists should have sorted their jumble of bones into separate sets of bone cards: cremated material, older adult bones, adult bones of unclear age, non-adult inhumations, undiagnostic bones (that can't be linked to an individual), and other bones that might not be human. Learners can now return to the **skeleton columns** set out at the end of Step 2 and look more closely at them for ageing clues. By comparing the skulls and skull fragments with the sets of non-cremated bone cards they've made, it should be possible to match skulls to appropriate sets of long bones. Learners should be made aware that there may not be a skull / skull fragment for every individual.

As Step 4 doesn't relate to non-adults, it should be possible to use the measurements and notes on the non-adult bone cards to fully sort these into individuals. The cards for each individual should be laid out in their approximate anatomical positions using the annotated skeleton diagram on the **bone recording form** as a guide. By this stage learners should also be realising that there could be a lot of bones missing, an issue that is addressed as a discussion point in Step 5.

Step 4: Detecting the sex

The final clue needed for sorting the adult **bone card** sets into individuals is to work out whether the bones are from a male or a female person. Skeletal features relating to sex are not obvious in children's bones; there are subtle differences that are detectable but these are hard to interpret and only become defined after puberty. As a result, in all but exceptional cases non-adult human remains are not sexed in archaeological *assemblages*. For adults, the most diagnostic bones for sexing an individual are the pelvis and skull. The pelvis is by far the best skeletal indicator as a female pelvis has features adapted for childbearing. The general rule is that all the key features of a female pelvis are broader (sciatic notch) and wider (subpubic angle and pelvic inlet) than a male pelvis. Turning to the skull, a male cranium is often larger than a female with a more developed supra-orbital brow ridge and thicker, more rounded eye sockets. A male mandible (jaw) has quite a square chin whereas a female is more pointed. However, there is overlap between the sexes and it is not uncommon for individuals to exhibit a mixture of masculine and feminine features.

The rest of the skeleton offers possible clues to sex, the length of the clavicle being one example, but these can often be subtle and harder to interpret with any great confidence. As learners will discover, the differences that enable bones to be distinguished as male or female will only become apparent through careful comparison with other bones of the same type. Adult female skeletons are usually slighter in build and shorter in height than a male where the bones are also more robust and show greater development at the muscle attachment points. Female hip bones are more outward flaring than in males.

Once the unburnt **bone card** sets have been further divided by sex, it should be possible for the group(s) to complete the task of sorting and laying out their cards into the **skeleton columns** of individual people. Even after filtering by age and sex, there will still be bone matching challenges where educated guesswork will be required. Comparing the dimensions of the bones will prove really important for this final stage. As an example, learners may find they have two young adult females in their Assemblage. All the smaller dimensioned bones are likely to be from one female and all the larger dimensioned bones from the other. The logic here is that human skeletons are usually quite evenly proportioned and it's unusual to get a long armed, short legged person, for example. Another useful dimension comparison hint for bones that occur in duplicates in the body (e.g. long bones, hips and ribs) is that where bones are of identical type and length but from opposite sides of the body, it is likely that they are a matching pair or set from the same person.

This oblique view of the entrance to Cairnholy II in Galloway was generated by laser scanning.

Step 5: Preservation and fragmentation

As the activity draws to a conclusion, the trainee osteoarchaeologists should find themselves with a far less jumbled pile of bones. In front of them should rest a row of individual inhumation **skeleton columns**, a cremation card and perhaps a non-human bone card sat on its own. There may also be a small collection of inhumation **bone cards** that it hasn't been possible to assign to any individual. All the human bones included in our *assemblages* do have sufficient data to assign them to individuals – but finishing with a pile of unassigned cards is entirely acceptable and actually quite a realistic result which reflects the average analysed chambered cairn *assemblage*. By this stage, learners should be sufficiently armed with cumulative knowledge on the ageing and sexing of unburnt bones to return to their cremated material bone card and estimate how many individuals are represented amongst the burnt bone fragments. The remaining sections of their **bone recording form** can also be completed as preparation for reporting and discussing their findings.

If they haven't already done so, the most obvious observation learners are likely to make in this closing stage of the activity is how incomplete their **skeleton columns** are compared to the annotated skeleton diagram on their recording forms. The survival of human remains from the Neolithic can be affected by many different factors, such as soil acidity, the size and fragility of the bones, exposure to natural erosive forces (such as water or frost) or to wild animals, to name just a few. There are also human factors at play, such as selective deposition (where only some bones are placed in the tomb) or removal, where bones are taken away either during the tomb's use or long after it has been abandoned. Burnt bone is far more resistant to decay than unburnt bone and, where present, it generally survives. As a result, osteoarchaeologists often have to work with fragments of bones. This limits the amount of information they can gather about the individual. As much as 46% of an *assemblage* could be fragments of bone that cannot be used to identify age, gender or be attributed to an individual. In the 'Bone Detectives' activity, this factor is reflected in bone cards such as the non-adult skull in Assemblage 1 where only the largest bone survives (the mandible / jaw). From toddlerhood to teens, many human bones are still forming and fusing together – the long bones and the skull being prime examples. The thin, unfused parts of the juvenile skull are less likely to survive or be identifiable, leaving just the mandible with its highly informative teeth. As they reflect on their analysis, learners will have found that some bone cards were more useful than others, as their Assemblage contained well preserved / complete and poorly preserved / incomplete bones. Their collection of unassigned bone cards will mostly consist of poorly preserved, incomplete or undiagnostic bones.

◄ **The Giant's Graves on Arran survives as a wide forecourt with two fallen flanking stones leading to an impressive segmented chamber. In this vertical aerial photograph, you can see one of the square-ended horns of the forecourt (bottom left), the segmented chamber with displaced *capstone* to one side (centre), and the *sill stones* and *orthostats* of the rear-facing chamber (top).**

Analysing the Assemblage

For the benefit of educators leading this activity, and to encourage the learners through the concluding analysis reporting stage, we have included short explanations of each Assemblage below. These contain the 'answers' and summarise the main points that can be expected from analysing each jumble of bones. The **Assemblage Tables** also provide a quick reference set of solutions for the four Assemblages, detailing which cards combine to make up the individuals as well as the basic age and sex interpretation of each.

Assemblage 1 has an MNI of five [calculated using the number of unburnt human skulls and the presence of cremated material] although it actually contains the remains of seven individuals plus one non-human. There are five inhumations: three adults [identified using bone size and the presence of diagnostic sexing evidence], one of whom is female [identified using the shape of the pelvis and skull]; and two non-adults [identified using bone size and the presence of unfused features], both of whom are missing all or most of the skull. The small bones are an assortment from all the inhumed individuals and confirm that a range of ages and sexes are present. One of the male adults probably died as a result of blunt force trauma to the head [unhealed skull injury] when he was 45 years or older [degenerative joint disease]. The younger adult was aged 18–25 [unfused clavicle] when he died and had suffered an unknown infectious disease which he'd recovered from during his lifetime [dental enamel hypoplasia and lamellar bone growth]. The female was quite old when she died (age 45+) [skull sutures not visible; pelvis has a wide sciatic notch; and osteoarthritis of the hip]. She also broke her left leg [tibia] which healed during her lifetime. The non-adults are a juvenile aged 5–6 years [tooth eruption] and a 16 year old adolescent [tibia and femur fusing]. There are two cremated individuals: a male and a female adult [identified using fragments of pelvis and skull]. The colour of the bone fragments suggests that the cremation fire may have been quite small as it was not very hot (up to 300° C). A dog skull has also been included. The presence of domesticated dog remains is far from unusual in tomb *assemblages* – 24 dog skulls were excavated from the passage tomb of Cuween Hill in Orkney.

ASSEMBLAGE 1	CARD DETAILS
Cremated Material	2 adults: 1 young and 1 old; 1 male and 1 female
Older Adult Male (age 45+)	Skull 1 Humerus 2 Clavicle 2 Radius 2
Young Adult Male (age 18-25)	Skull 2 Femur 1 Femur 3 Clavicle 1
Older Adult Female (age 45+)	Skull 3 Tibia 1 Clavicle 2 Pelvis 1 Humerus 3
Adolescent (16 years old)	Femur 2 Humerus 1 Radius 1 Tibia 2
Juvenile (5 years old)	Skull 4 Pelvis 2 Tibia 3 Femur 4
Assorted Small Bones	Bones from all human individuals represented
Dog	Skull 5

Assemblage 2 is more challenging and has an MNI of six [calculated using unburnt femurs and the presence of cremated material] although it actually contains the remains of nine individuals plus one non-human. There are five inhumations: four adults, two of whom are female, and one non-adult. The non-adult is an infant approximately 1 year old at the time of death [tooth eruption] and most likely died from an unidentifiable infectious disease [presence of woven bone]. The young adult female [identified from clavicle fusing and diagnostic skull and pelvis features] was possibly the mother of the child as she also died from an unknown infectious disease [presence of woven bone] which she may have passed on to the child through close contact or feeding. The mature adult male was probably aged 26–44 and in the prime of life [identified from clavicle fusing, fully fused but visible skull suture lines and tooth wear] when a deliberate blunt force trauma to the head [unhealed rectangular hole in top of skull] from a stone implement ended his life. As with Assemblage 1, the two old adults (age 45+) are identifiable by age-related health deteriorations [degenerative joint disease and osteoarthritis]. The assorted small bones include a range of ages and sexes that correspond to the entombed individuals but a lack of articulation or diagnostic features prevents them from being matched to any specific individual. There are four cremated individuals: three adult males and one non-adult [identified using bone quantities, variations in size and diagnostic features visible on the identifiable fragments]. The bone fragments are of two colours suggesting the bodies were burned in at least two separate cremation events. An otter skull is also included, representing a later use of the tomb as an animal den.

ASSEMBLAGE 2	CARD DETAILS
Cremated Material	3 adult males 1 non-adult
Older Adult Male (age 45+)	Skull 1 Femur 2
Mature Adult Male (age 26-44)	Skull 2 Humerus 1 Tibia 1 Fibula 2 Clavicle 2
Older Adult Female (age 45+)	Skull 3 Femur 4 Clavicle 1 Pelvis 2
Young Adult Female (age 18-25)	Clavicle 3 Pelvis 1 Radius 1 Femur 1 Femur 5 Ulna 2
Infant (age 6-12 months)	Skull 4 Femur 3 Ulna 1 Fibula 1
Assorted Small Bones	Bones from all human individuals represented
Otter	Skull 5

Assemblage 3 is of a similar difficulty level to Assemblage 1 but with the notable difference of having no notes to assist with card sorting. It has an MNI of six [calculated using skulls and the presence of cremated material] which is also the actual total number of individuals. There are five inhumations: an old and young adult male, an old and young adult female and one non-adult. The bones of the older individuals (age 45+) are distinguishable by severe tooth wear, tooth loss and bone disease associated with old age [osteoarthritis of the knee and hip]. Sex determination requires comparison of the skull characteristics, long bone lengths of the same type [male are larger with strong muscle attachments, female are shorter with narrower bone shafts], and pelvic features [wide sciatic notch and subpubic angle for the female]. The young male [aged 18-25 by fused but visible skull suture lines and unfused clavicle medial epiphysis] broke his left arm during his lifetime which has successfully healed. The non-adult individual is an adolescent of around 16 years of age [medium skull size, molars still to erupt and tibia proximal epiphysis not yet fused]. The presence of woven bone formation but no conversion to lamellar bone suggests that the teen died from an unknown infectious disease. There is only one cremated individual

ASSEMBLAGE 3	CARD DETAILS
Cremated Material	1 adult male
Older Adult Male (age 45+)	Skull 1 Humerus 3 Clavicle 2 Ulna 2 Tibia 1
Young Adult Male (age 18-25)	Skull 2 Radius 1 Clavicle 1
Older Adult Female (age 45+)	Skull 3 Tibia 2 Clavicle 3 Pelvis 2 Femur 1 Humerus 1 Radius 2
Young Adult Female (age 18-25)	Skull 4 Pelvis 1 Femur 2 Humerus 2 Ulna 1
Adolescent (16 years old)	Skull 5 Tibia 3
Assorted Small Bones	Bones from all human individuals represented

[light weight and no duplication within the identifiable fragments] who is likely a male [diagnostic skull and pelvis fragments] aged 18-35 [estimated by tooth wear] at the time of death. His body was cremated in a hot, efficient fire [based on bone colour]. The assorted small bones confirm the presence of the different ages and sexes. Of special note are the epiphyses that relate to the young adults [clavicles] and non-adult [tibia].

Assemblage 4 is quite a challenge with an MNI of six [calculated using the humeri and presence of cremated material] but with an actual total of 11 individuals plus one non-human. There are six inhumations: an old and young adult male, an old and young adult female and two non-adults. The old adults (age 45+) present fully fused but more fragile bone as well as severe tooth wear, tooth loss, degenerative bone and joint disease [osteoarthritis of the hip and acromioclavicular (clavicle)]. The young adult male aged 18-25 [light tooth wear and complete long bone fusing] likely died from an unknown infectious disease [presence of woven bone formation but no conversion to lamellar bone]. The young adult female [aged 18-25 by unfused pelvic crests and fused but visible skull suture lines] suffered a major break to her left leg [both tibia and fibula fractured] during life which did eventually heal. The presence of lamellar bone growth and dental enamel hypoplasia would suggest that she also recovered from an unknown infectious disease; this may have been a direct consequence of her broken leg. The clues left by this disease across her bones significantly assist with matching otherwise undiagnostic bones to this individual. The non-adult individuals are distinguishable by the lack of clear sexing evidence. The unfused ends of the long bones [humeri, radius and clavicle] suggest an adolescent of around 16 years of age. The rib cage is significantly smaller and is therefore from a separate individual who was at the lower end of the juvenile age range (7-12 years) at the time of death. The assorted small bones include a range of ages and sexes that correspond to the entombed individuals. The unfused small bone shafts and baby teeth likely originate from the non-adult juvenile but a lack of articulation prevents them from being confidently matched. The cremated material is both complex and numerous [heavy weight] with one adult male [matching narrow sciatic notch fragments], two adult females [wide sciatic notch fragments] and two non-adults [small and medium mandibles and baby teeth] represented. Different colours also suggest that the bodies were burned at different times through multiple cremation events. The fragments of femur (which occur in pairs in the human body) are the most obvious indicator of the total number of individuals [there are 9 bones to indicate 5 individuals]. Finally, the skull of a domesticated dog of Neolithic date is present and this may have been interred at the same time or at a later date. Only scientific dating of the human and dog remains could shed light on this question and so this mystery must remain unsolved, for now.

ASSEMBLAGE 4	CARD DETAILS
Cremated Material	1 adult male 2 adult females 2 non-adults
Older Adult Male (age 45+)	Skull 1 Humerus 4 Pelvis 2 Femur 1
Young Adult Male (age 18-25)	Skull 2 Femur 2 Radius 1
Older Adult Female (age 45+)	Skull 3 Clavicle 2 Humerus 3
Younger Adult Female (age 18-25)	Skull 4 Pelvis 1 Tibia 1 Fibula 1 Humerus 1 Humerus 6
Adolescent (16 years old)	Clavicle 1 Radius 2 Humerus 2 Humerus 5
Juvenile (7-12 years old)	Rib cage 1
Assorted Small Bones	Bones from all human individuals represented
Dog	Skull 5

Glossary

An **antechamber** is a small chamber or room that leads to (or is placed before) the main chamber or room.

An archaeological **assemblage** is a group of artefacts associated by common characteristics such as style, context, material or chronology.

A **capstone** is a large slab set across the chamber forming its roof.

A **conchoidal fracture** is a fracture with a smooth, curved surface that resembles the interior of a clamshell; they occur in brittle materials like flint, quartz and glass where there are no natural planes of separation.

A **corbel** is a slab used in roofing. Jutting out above the orthostats in a chamber, corbels gradually overlap to step upwards and inwards towards the centre to achieve a domed effect, leaving only a small opening. This opening is sealed by a single slab known as a roof stone.

A **façade** is the front of a building or structure that faces a public space, and particularly refers to those that are imposing or decorative.

A **human relic** is a part of a dead body kept as an object of reverence, usually a bone, mummified organ, lock of hair or tooth.

Interment is the burial of a corpse in a grave or tomb, typically with funeral rites.

A **jamb stone** is a narrow upright stone that has been placed against the side of the chamber adjacent to another – the pair act to divide the chamber into sections.

A **lintel** is a large slab set above and across the entrance to the chamber.

A **megalith** (lit. 'large stones') is a prehistoric construction of large stones and boulders.

Narrative interpretation explores the ideas and meanings behind the archaeological evidence. The narrative approach draws upon both objective evidence and subjective analysis to explore the purpose of chambered cairns and the associated ceremonies and rituals.

Objective recording involves the detailed and precise survey of chambered cairns using digital documentation techniques such as photogrammetry and laser scanning.

An **orthostat** is a large upright stone or slab forming part of the structure of a chambered cairn – the main elements in the construction of the galleries and chambers.

An **ossuary** is a place where the bones of the dead are kept, usually to make room in the cemetery.

An **outcrop** is part of a rock formation or mineral vein that is visible on the surface.

A **septal slab** is a high upright stone that has been placed across the floor of the chamber and that acts to divide it into sections.

A **sill stone** is a low upright stone that has been placed across the chamber and that acts to define different sections.

Subjective analysis involves the study of digital documentation, personal observation and experience, and the creation of a more nuanced record by measured drawing and annotation.

Taphonomy is the study of the various processes (such as burial, decay and preservation) that affect animal and plant remains as they become fossilized.

Skull 1

Size: Large

Teeth: No mandible present, all permanent teeth erupted, all very heavily worn

Age: Suture lines no longer visible

Sex: Well-developed brow ridge and thick rounded eye sockets

Health: Unhealed injury by a blunt object

Notes: Unhealed injuries suggest the most likely cause of death

Humerus 2

Length: 30 cm

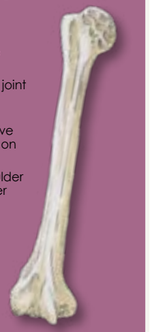
Side: Left

Age: Both ends are fully fused

Sex: Wide shoulder joint end, strong muscle attachments

Health: Degenerative joint disease visible on joint surfaces

Notes: A male shoulder joint is usually bigger than a female



Clavicle 2

Length: 17 cm

Side: Right

Age: Both ends are fully fused

Sex: Bone length indicates the sex

Health: Osteoarthritis present

Notes: A male clavicle is usually 15 cm or longer

Skull 2

Size: Large

Teeth: All permanent teeth erupted, all slightly worn

Age: Visible fully fused suture lines

Sex: Well-developed brow ridge, thick rounded eye sockets, square chin

Health: Dental Enamel Hypoplasia

Notes: Lines on tooth surface suggest a time of illness or malnutrition

Femur 1

Length: 50 cm

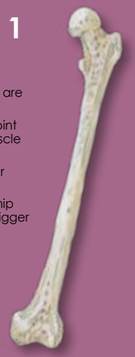
Side: Left

Age: Both ends are fully fused

Sex: Wide hip joint end, strong muscle attachments

Health: Lamellar bone present

Notes: A male hip joint is usually bigger than a female



Femur 3

Length: 50 cm

Side: Right

Age: Both ends are fully fused

Sex: Wide hip joint end, strong muscle attachments

Health: Lamellar bone present

Notes: Woven bone turns to lamellar when infectious disease heals

Clavicle 1

Length: 16 cm

Side: Left

Age: Lateral end fused, medial end unfused

Sex: Bone length indicates the sex

Health: Lamellar bone present

Notes: Lateral end fuses from age 18, medial end age 25+

Tibia 1

Length: 37.5 cm

Side: Left

Age: Both ends are fully fused

Sex: Narrow head joint width

Health: Healed fracture

Notes: Most commonly broken long bone in the human body

Clavicle 3

Length: 13.7 cm

Side: Right

Age: Both ends are fully fused

Sex: Bone length indicates the sex

Pelvis 1

Size: Large

Parts: Left and right hip bones

Age: Bones have fully fused

Sex: Wide sciatic notch, wide subpubic angle, wide pelvic inlet

Health: Osteoarthritis of the hip joint

Notes: The pelvis is really useful for sexing adult skeletons as a female is wider for childbirth

Skull 3

Size: Large

Teeth: All permanent teeth erupted, all very heavily worn, some teeth lost during life

Age: Suture lines no longer visible

Sex: Sharp eye socket margins, pointed chin

Health: Gum disease

Pelvis 2

Size: Small

Parts: Right hip bone only

Age: Bone is unfused

Sex: Not enough clear evidence

Skull 4

Size: Small mandible

Teeth: All baby teeth fully grown, X-ray shows permanent teeth almost ready to erupt

Age: One permanent tooth erupting

Sex: Not enough clear evidence

Notes: Permanent teeth start erupting from age 5

Tibia 3

Length: 16.5 cm

Side: Left

Age: Unfused ends

Sex: Not enough clear evidence

Notes: Fusing starts in early teens

Radius 1

Length: 21 cm

Side: Right

Age: Proximal (upper) end fused, distal end unfused

Sex: Not enough clear evidence

Notes: Proximal end fuses age 12-18, distal end fuses age 14-20

Tibia 2

Length: 36 cm

Side: Left

Age: Proximal end fused, distal end unfused

Sex: Not enough clear evidence

Notes: Proximal end fuses age 14-20, distal end fuses age 14-18

Femur 2

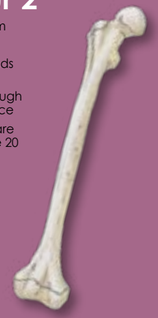
Length: 44 cm

Side: Right

Age: Both ends are unfused

Sex: Not enough clear evidence

Notes: Ends are fused by age 20



Humerus 1

Length: 29 cm

Side: Left

Age: Distal end fused, proximal end unfused

Sex: Not enough clear evidence

Notes: Distal end is fused by age 17

Assorted Small Bones

Hand: Matching bones but of different sizes

Foot: Matching bones but of different sizes

Vertebrae: Different sizes, some with degenerative joint disease (spinal), some with osteoarthritis

Ribs: Different lengths, some with unfused ends

Epiphyses: Unfused ends of various long bones including tibia, radius and femur

Loose Teeth: Mix of all tooth types, some are heavily worn, three baby teeth

Skull 5

Size: Small with no mandible

Teeth: All permanent teeth erupted, large canine teeth, big heavily worn molars

Age: Teeth suggest age 2-3

Sex: Not enough clear evidence

Health: Teeth worn from lots of bone chewing during life

Notes: Size and shape of skull similar to a large Collie dog

Cremated Material

Weight: 440 g

Colour: Brown-orange and black from a fire up to 300°C

Identifiable fragments

Teeth: Both light and heavily worn

Skull: One piece of well-developed brow ridge

Pelvis: Narrow and wide pieces of sciatic notch

Long bones: Humerus pieces from at least three different bones

Radius 2

Length: 26.5 cm

Side: Right

Age: Both ends are fully fused

Sex: Strong muscle attachments

Health: Degenerative joint disease visible on joint surfaces

Notes: Degenerative joint disease is most common in older age

Humerus 3

Length: 28 cm

Side: Right

Age: Both ends are fully fused

Sex: Narrow shoulder joint end, narrow bone shaft

Health: Osteoarthritis of the shoulder

Notes: Osteoarthritis is a joint disease often found in the hip, shoulder and knee

Femur 4

Length: 22 cm

Side: Right

Age: Both ends are recognisable and unfused

Sex: Not enough clear evidence

Notes: Ends recognisable age 3-6

Cremated Material

Weight: 850 g

Colour: Some white and well oxidised, some blue-grey and poorly oxidised from fires over 600°C

Identifiable fragments

Teeth: Worn permanent teeth, worn baby teeth

Skull: Lots of well developed brow ridge pieces, one small eye socket piece, large cranium pieces from three adults

Pelvis: Pieces from a small pelvis, narrow sciatic notch pieces

Long bones: Humerus pieces from at least seven different bones

Skull 1

Size: Large

Teeth: All permanent teeth erupted, all very heavily worn, some teeth lost during life

Age: Suture lines no longer visible

Sex: Well-developed brow ridge, thick rounded eye sockets

Health: Gum disease

Femur 2

Length: 52 cm

Side: Right

Age: Both ends are fully fused

Sex: Wide hip joint end, strong muscle attachments

Health: Degenerative joint disease visible on joint surfaces

Notes: A female hip joint is usually narrower than a male

Skull 2

Size: Large

Teeth: All permanent teeth erupted

Age: Fully fused along suture lines

Sex: Well-developed brow ridge, thick rounded eye sockets, square chin

Health: Unhealed injury made by a blunt object

Notes: Unhealed injuries suggest the most likely cause of death

Humerus 1

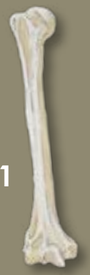
Length: 30 cm

Side: Right

Age: Both ends are fully fused

Sex: Wide shoulder joint end, strong muscle attachments

Notes: Ends are fused by age 21



Fibula 1

Length: 10.1 cm

Side: Left

Age: Both ends are unfused, average length for age 6 months – 18 months

Sex: Not enough clear evidence

Health: Woven bone present

Notes: Ends fuse age 14-20

Clavicle 2

Length: 15.5 cm

Side: Right

Age: Both ends are fully fused

Sex: Bone length indicates the sex

Notes: Adult male clavicles are usually 15 cm or longer

Skull 3

Size: Large

Teeth: No mandible present, all permanent teeth erupted, all very heavily worn

Age: Suture lines no longer visible

Sex: Sharp eye socket margins

Health: Dental Enamel Hypoplasia

Notes: Lines on tooth surface suggest a time of illness or malnutrition

Clavicle 1

Length: 12 cm

Side: Left

Age: Both ends are fully fused

Sex: Bone length indicates the sex

Notes: Adult male clavicles are usually 15 cm or longer

Pelvis 2

Size: Large

Parts: Right hip bone only

Age: Bones have fully fused

Sex: Wide sciatic notch, wide subpubic angle

Health: Osteoarthritis of the hip joint

Notes: The pelvis is really useful for sexing adult skeletons as a female is wider for childbirth

Fibula 2

Length: 36 cm

Side: Right

Age: Both ends are fully fused

Sex: Strong muscle attachments

Health: Healed fracture

Notes: It is common for the tibia and fibula to break together

Tibia 1

Length: 39 cm

Side: Right

Age: Both ends are fully fused

Sex: Strong muscle attachments

Health: Healed fracture

Notes: Most commonly broken long bone in the human body

Femur 4

Length: 48.5 cm

Side: Right

Age: Both ends are fully fused

Sex: Small joint ends, narrow bone shaft

Health: Degenerative joint disease visible on joint surfaces

Notes: A male hip joint is usually bigger than a female

Femur 1

Length: 46.5 cm

Side: Right

Age: Both ends are fully fused

Sex: Small joint ends, narrow bone shaft

Health: Woven bone present

Notes: Fusing is complete by age 20

Femur 5

Length: 46.5 cm

Side: Left

Age: Both ends are fully fused

Sex: Small joint ends, narrow bone shaft

Health: Woven bone present

Notes: Woven bone forms as a response to infectious disease

Clavicle 3

Length: 11.8 cm

Side: Left

Age: Lateral end fused, medial end unfused

Sex: Bone length indicates the sex

Health: Woven bone present

Notes: Lateral end fuses from age 18, medial end age 25+

Pelvis 1

Size: Large

Parts: Left and right hip bones

Age: Iliac crests unfused

Sex: Wide sciatic notch, wide subpubic angle, wide pelvic inlet

Health: Woven bone present

Notes: Iliac crests fuse by age 23

Radius 1

Length: 23.3 cm

Side: Left

Age: Both ends are fully fused

Sex: Small joint ends, narrow bone shaft

Health: Healed fracture, woven bone present

Notes: The most commonly broken arm bone, usually from a fall

Skull 4

Size: Very small mandible

Teeth: Five front baby teeth erupted, X-ray shows baby teeth still developing

Age: Teeth indicate age

Sex: Not enough clear evidence

Health: Woven bone present

Notes: Baby molars start erupting from age 12 months

Femur 3

Length: 12.9 cm

Side: Right

Age: Both ends are unfused; average length for age 6 months – 18 months

Sex: Not enough clear evidence

Health: Woven bone present

Notes: Woven bone forms as a response to infectious disease

Assorted Small Bones

Hand: Most of similar adult sizes, with some tiny sizes present

Foot: Most of similar adult sizes, with some tiny sizes present

Vertebrae: Different sizes, some withdegenerative joint disease (spinal), some with osteoarthritis

Ribs: Different lengths, some with unfused ends

Epiphyses: Unfused ends of bones, most tiny sizes, one large clavicle

Loose Teeth: Mix of all tooth types, some are heavily worn, some baby teeth

Skull 5

Size: Small, long and narrow

Teeth: All permanent teeth erupted, large canines and incisors, sharp jagged molars

Age: Skull features suggest age 8

Sex: Not enough clear evidence

Health: Nothing of note

Notes: Teeth, powerful jaw and skull shape match an otter

Ulna 2

Length: 22 cm

Side: Left

Age: Both ends are fully fused

Sex: Narrow bone shaft

Health: Woven bone present

Notes: All ends are fused by age 20

Ulna 1

Length: 8.6 cm

Side: Right

Age: Both ends are unfused, average length for age 6 months – 18 months

Sex: Not enough clear evidence

Health: Woven bone present

Notes: Proximal end fuses from age 12

Cremated Material

Weight: 220 g
Colour: White and well oxidised from a fire over 600°C

Identifiable fragments
Teeth: Well worn
Skull: Well-developed brow ridge, rounded eye socket
Pelvis: Narrow sciatic notch piece
Long bones: Pieces of large bone shaft

Skull 1

Size: Large
Teeth: All permanent teeth erupted, all very heavily worn, some teeth lost during life
Age: Suture lines no longer visible
Sex: Well-developed brow ridge, thick rounded eye socket
Health: Gum disease

Clavicle 2

Length: 16 cm
Side: Left
Age: Both ends are fully fused
Sex: Bone length indicates the sex
Health: Degenerative joint disease visible on joint surfaces

Humerus 3

Length: 30.5 cm
Side: Right
Age: Both ends are fully fused
Sex: Wide shoulder joint end, strong muscle attachments
Health: Degenerative joint disease visible on joint surfaces

Ulna 2

Length: 26.5 cm
Side: Left
Age: Both ends are fully fused
Sex: Strong muscle attachments
Health: Degenerative joint disease visible on joint surfaces

Tibia 1

Length: 39.6 cm
Side: Right
Age: Both ends are fully fused
Sex: Strong muscle attachments
Health: Osteoarthritis of the knee

Radius 1

Length: 28.5 cm
Side: Left
Age: Both ends are fully fused
Sex: Strong muscle attachments
Health: Healed fracture

Skull 2

Size: Large
Teeth: No mandible present, all permanent teeth erupted, slightly worn
Age: Visible fully fused suture lines
Sex: Well-developed brow ridge, thick rounded eye sockets, square chin

Clavicle 1

Length: 17.5 cm
Side: Left
Age: Lateral end fused, medial end unfused
Sex: Bone length indicates the sex
Health: Healed fracture

Skull 3

Size: Large
Teeth: All permanent teeth erupted, all very heavily worn, some teeth lost during life
Age: Suture lines no longer visible
Sex: Sharp eye socket margins, pointed chin
Health: Gum disease

Clavicle 3

Length: 13.8 cm
Side: Right
Age: Both ends are fully fused
Sex: Bone length indicates the sex
Health: Degenerative joint disease visible on joint surfaces

Pelvis 2

Size: Large
Parts: Left and right hip bones
Age: Bones have fully fused
Sex: Wide sciatic notch, wide subpubic angle
Health: Osteoarthritis of the hip joint

Femur 1

Length: 47.5 cm
Side: Right
Age: Both ends are fully fused
Sex: Small joint ends, narrow bone shaft
Health: Osteoarthritis of the hip joint

Tibia 2

Length: 36.5 cm
Side: Left
Age: Both ends are fully fused
Sex: Narrow bone shaft
Health: Osteoarthritis of the knee

Radius 2

Length: 24.3 cm
Side: Left
Age: Both ends are fully fused
Sex: Small joint ends, narrow bone shaft
Health: Degenerative joint disease visible on joint surfaces

Humerus 1

Length: 27 cm
Side: Right
Age: Both ends are fully fused
Sex: Narrow shoulder joint end, narrow bone shaft
Health: Degenerative joint disease visible on joint surfaces

Femur 2

Length: 48.5 cm
Side: Right
Age: Both ends are fully fused
Sex: Small joint ends, narrow bone shaft

Skull 4

Size: Large
Teeth: All permanent teeth erupted, slightly worn
Age: Visible fully fused suture lines
Sex: Sharp eye socket margins, pointed chin

Pelvis 1

Size: Large
Parts: Left and right hip bones
Age: Iliac crests unfused
Sex: Wide sciatic notch, wide subpubic angle, wide pelvic inlet

Ulna 1

Length: 24 cm
Side: Right
Age: Both ends are fully fused
Sex: Narrow bone shaft

Humerus 2

Length: 28 cm
Side: Right
Age: Both ends are fully fused
Sex: Narrow shoulder joint end, narrow bone shaft

Tibia 3

Length: 35.8 cm
Side: Right
Age: Proximal end fused, distal end unfused
Sex: Not enough clear evidence
Health: Woven bone present

Skull 5

Size: Medium
Teeth: Largest permanent molars not erupted, slightly worn
Age: Visible fully fused suture lines
Sex: Not enough clear evidence
Health: Woven bone present

Assorted Small Bones

Hand: Matching bones but of different sizes
Vertebrae: Different sizes, some with osteoarthritis
Ribs: Different lengths, some with unfused ends
Epiphyses: Mix of unfused ends including tibia and clavicle
Loose Teeth: Mix of permanent teeth, some are heavily worn
Mandible: Pieces of medium size

Cremated Material

Weight: 1650 g

Colour: Mix of brown-orange, blue-grey and white pieces

Identifiable Fragments

Teeth: Worn and heavily worn permanent teeth, worn baby teeth

Skull: Rounded and sharp large eye socket pieces, small and medium mandible pieces, thick and thin cranium pieces

Pelvis: Some pieces from small and medium pelvis (both with large wide sciatic notch), pieces of large pelvis (with narrow sciatic notch)

Long bones: Mixed size femur pieces from at least nine different bones, some unfused ends

Skull 1

Size: Large

Teeth: No mandible present, all permanent teeth erupted, all very heavily worn

Age: Suture lines no longer visible

Sex: Well-developed brow ridge, thick rounded eye sockets

Humerus 4

Length: 31.5 cm

Side: Right

Age: Both ends are fully fused

Sex: Wide shoulder joint end, strong muscle attachments

Health: Degenerative joint disease visible on joint surfaces

Femur 1

Length: 51.1 cm

Side: Left

Age: Both ends are fully fused

Sex: Wide hip joint end, strong muscle attachments

Health: Degenerative joint disease visible on joint surfaces

Pelvis 2

Size: Large

Parts: Left hip bone only

Age: Bones have fully fused

Sex: Narrow sciatic notch, narrow subpubic angle

Health: Osteoarthritis of the hip joint

Radius 1

Length: 26 cm

Side: Left

Age: Both ends are fully fused

Sex: Strong muscle attachments

Health: Woven bone present

Skull 2

Size: Large

Teeth: All permanent teeth erupted, lightly worn

Age: Visible fully fused suture lines, strong healthy bone

Sex: Well-developed brow ridge, thick rounded eye sockets, square chin

Health: Woven bone present

Femur 2

Length: 49.1 cm

Side: Right

Age: Both ends are fully fused

Sex: Wide hip joint end, strong muscle attachments

Health: Woven bone present

Skull 3

Size: Large

Teeth: All permanent teeth erupted, very heavily worn, some teeth lost during life

Age: Fully fused along suture lines, bone more fragile

Sex: Sharp eye socket margins, pointed chin

Health: Gum disease

Clavicle 2

Length: 13 cm

Side: Right

Age: Both ends are fully fused

Sex: Bone length indicates the sex

Health: Osteoarthritis present

Humerus 3

Length: 28 cm

Side: Left

Age: Both ends are fully fused

Sex: Narrow shoulder joint end, narrow bone shaft

Health: Degenerative joint disease visible on joint surfaces

Skull 4

Size: Large

Teeth: No mandible present, all permanent teeth erupted, slightly worn

Age: Visible fully fused suture lines

Sex: Sharp eye socket margins

Health: Dental Enamel Hypoplasia

Pelvis 1

Size: Large

Parts: Left and right hip bones

Age: Iliac crests unfused

Sex: Wide sciatic notch, wide subpubic angle, wide pelvic inlet

Health: Lamellar bone present

Fibula 1

Length: 33.7 cm

Side: Left

Age: Both ends are fully fused

Sex: Narrow bone shaft

Health: Healed fracture

Tibia 1

Length: 36.5 cm

Side: Left

Age: Both ends are fully fused

Sex: Narrow bone shaft

Health: Healed fracture

Humerus 1

Length: 27 cm

Side: Left

Age: Both ends are fully fused

Sex: Narrow shoulder joint end, narrow bone shaft

Health: Lamellar bone present

Humerus 6

Length: 27 cm

Side: Right

Age: Both ends are fully fused

Sex: Narrow shoulder joint end, narrow bone shaft

Health: Lamellar bone present

Humerus 5

Length: 30.5 cm

Side: Right

Age: Distal end fused, proximal end unfused

Sex: Not enough clear evidence

Humerus 2

Length: 30.5 cm

Side: Left

Age: Distal end fused, proximal end unfused

Sex: Not enough clear evidence

Rib Cage 1

Size: Small

Parts: 10 matching pairs of ribs

Age: Unfused ends (juvenile)

Sex: Not enough clear evidence

Assorted Small Bones

Long bones: Pieces of small bone shafts

Vertebrae: Different sizes, some with osteoarthritis

Ribs: Most large and medium, four small with unfused ends

Epiphyses: Mix of unfused ends

Loose Teeth: Mix of permanent teeth, some are heavily worn, some baby teeth

Skull: Pieces of large and small cranium

Skull 5

Size: Very small

Teeth: All permanent teeth erupted, large canine teeth, big heavily worn molars

Age: Teeth suggest age 2-3

Sex: Not enough clear evidence

Health: Teeth worn from lots of bone chewing during life

Clavicle 1

Length: 14.5 cm

Side: Left

Age: Both ends are unfused

Sex: Not enough clear evidence

Radius 2

Length: 23.2 cm

Side: Right

Age: Proximal end fused, distal end unfused

Sex: Not enough clear evidence

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The authors draw on the work of leading archaeologists to describe a time and tradition far removed from today. As both illustrated reference material and creative learning resource, the practitioner is prepared with detailed knowledge and innovative ideas for their learners.

A fresh take on a fascinating subject, this resource will be of interest to teachers, archaeological educators and anyone with an interest in the presentation and interpretation of our ancient past.

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