

The Stones of Stonehenge Project

Interim Report 2016



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Summary

The Preseli hills of Pembrokeshire are famous for their sources of Stonehenge's megaliths known as 'bluestones'. These are the smallest of Stonehenge's famous standing stones, being mostly 4m long or less and weighing on average less than 2 tonnes. The bluestones are a variety of different rocks, mostly spotted dolerites and also rhyolites, volcanic tuffs, sandstones and unspotted dolerite. Virtually all are thought to originate in Preseli or to the north of it. Recent geological analysis has matched one of Stonehenge's bluestone rhyolites to Craig Rhos-y-felin (Ixer and Bevins 2011), one of the spotted dolerites to Carn Goedog, and unspotted dolerites to Cerrigmarchogion (Bevins *et al.* 2013).

The Stones of Stonehenge Project has been carrying out fieldwork each September since 2011 to establish whether there is evidence for prehistoric extraction of monoliths and whether this extraction might be linked to Neolithic monuments in the outcrops' vicinity.

Fieldwork during September 2016 included archaeological excavation of Carn Goedog bluestone quarry and Pensarn prehistoric tomb. Geophysical survey identified a group of prehistoric circular enclosures west of the Pensarn tomb as well as a historical-period enclosed settlement to its east. Scientific analysis of the outcrops included portable XRF study of the chemical composition within the outcrops of Craig Rhos-y-felin and Carn Goedog, and cosmogenic dating of exposed surfaces within these outcrops to date monolith extraction by measuring their doses of cosmic radiation.

The last of three field seasons at Carn Goedog saw the excavation of a large area of over 140 sq m against the southern edge of the outcrop. Evidence for prehistoric activity, some of it already dated to the second half of the 4th millennium BC (Middle Neolithic), consisted of features and stone artefacts in layers below those dated to the last 2,000 years. Most of these excavated deposits lay to the east of (and beneath) a zone of post-medieval quarrying dated by artefacts to *c.*AD 1800. The main features consisted of a platform of stone slabs immediately beneath the south face of the outcrop, an 11m-long, stone-filled ditch south of the platform, a zone of redeposited sediment (presumably upcast from the ditch) forming a level surface south of the ditch, and an array of small orthostat stones forming the southern and western perimeter of the upcast sediment. Among the six artefacts identified as stone wedges, two were found stratified within the upcast sediment and in a pit cut into this sediment.

A circular mound at Pensarn, located between the three geologically identified outcrops that are sources of Stonehenge's bluestones, was excavated to find out if it dated to the time of Stonehenge. Geophysical survey in 2015 identified stone structures within the mound thought to include a passage and chamber consistent with its being a Middle Neolithic passage tomb. Excavation in 2016 revealed that it was, in fact, an Early Bronze Age kerb cairn dating to *c.*2000 BC, a thousand years later than the dates for megalith extraction so far obtained from Carn Goedog and Craig Rhos-y-felin. Stone-robbing in the post-medieval period had altered its shape to coincidentally resemble that of a Neolithic passage tomb. The kerb cairn was built of local rhyolite stones, initially about 12m across but later enlarged to 27m in diameter. Its central burial was a stone cist covered by a large capstone. Part of a severely eroded human femur at the base of the cist may be all that survives of an inhumation burial, due to the highly acidic soil. Scattered cremated bone fragments and abraded sherds of plain Early Bronze Age pottery in the fill of the cist may be the remains of earlier burials within the cist disturbed by this interment. A complete Early Bronze Age pot (known as a Food Vessel Urn) was buried with cremated human bones beneath the northern edge of the initial cairn.

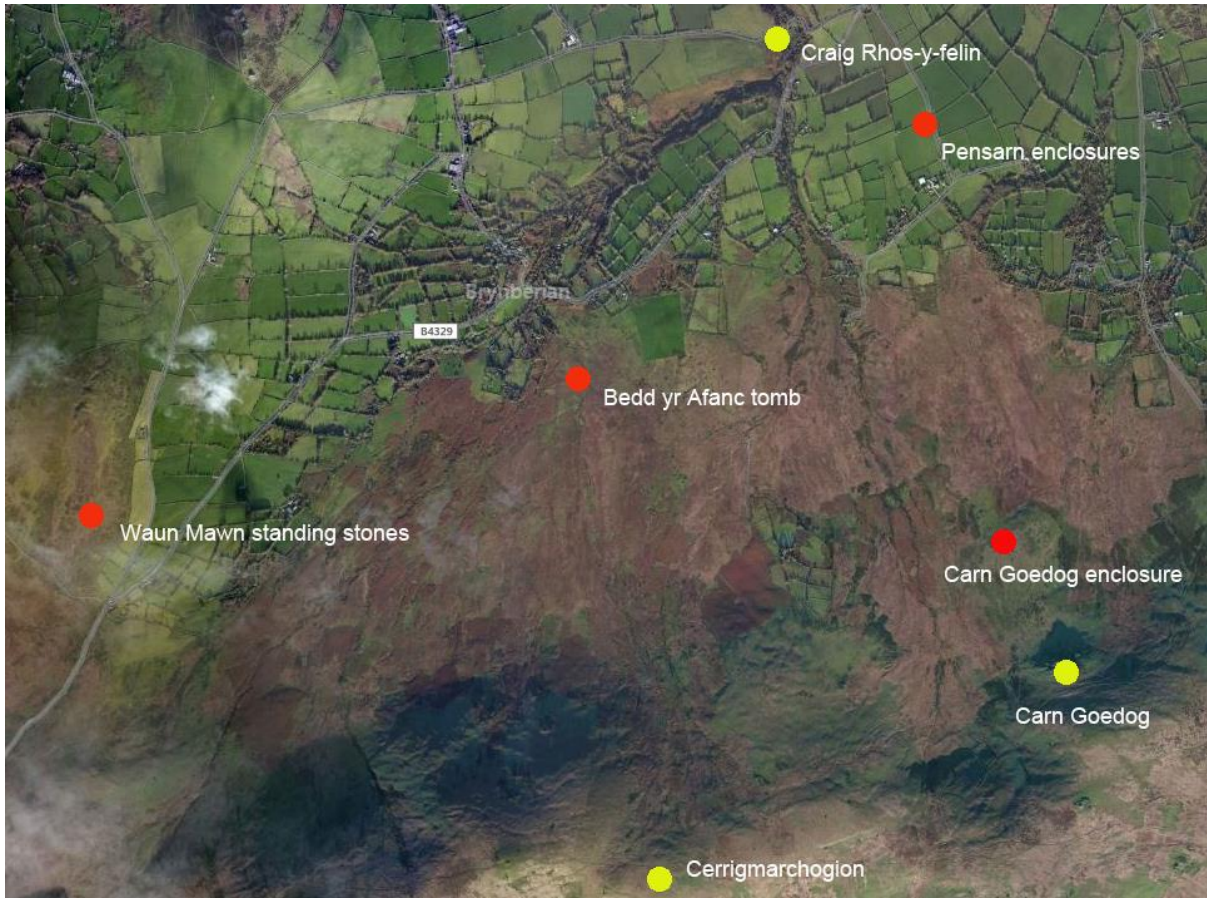


Figure 1. Known sources of Stonehenge bluestones in Preseli (yellow) and possible Neolithic sites (red) in their vicinity, including the Pensarn enclosures (see Figure 2)

Research objectives in 2016

The project's sixth season aimed to complete one excavation – the megalithic quarry of Carn Goedog and commence another on a prehistoric tomb at Pensarn. We also carried out further geophysical survey of the Pensarn area, and petrological sampling of rocks from the Stonehenge bluestone sources of Craig Rhos-y-felin and Carn Goedog.

Carn Goedog

The prime aims of investigation in 2016 were:

1. To re-open and extend the main trench excavated in 2014-2015 to gather further evidence of Neolithic megalith quarrying and associated environmental data.
2. To establish the full extent of the prehistoric ditch and gather further dating material from it.
3. To extend the southern edges of the trench to establish the nature and date of the redeposited material beyond the ditch.

Pensarn

The prime aims of excavation in 2016 of this tomb were to establish:

1. Whether this was a Middle Neolithic passage tomb.
2. Its dates of construction, use and abandonment.
3. The geological character of its stones, to compare with Stonehenge's bluestone assemblage and the local bluestone sources.

4. Any stone sockets (for dimensions and broken chips or stumps) to compare with Stonehenge bluestones.
5. Its contents (cremated bone, stone artefacts etc.).
6. The environmental context of the site (charred wood analysis, palynology, soil micromorphology).

Geophysical survey

The prime aim of investigation in 2016 was:

1. To carry out geophysical survey in the area of Pensarn, between the megalith quarries of Carn Goedog and Craig Rhos-y-felin.

Petrological sampling

The aims of investigation in 2016 were:

1. To assess the reliability of portable XRF analysis of Craig Rhos-y-felin rhyolite and Carn Goedog spotted dolerite, to decide on a suitable sampling strategy for closer characterisation of the geology of these outcrops and for future identification of bluestones at Stonehenge.
2. To sample Craig Rhos-y-felin and Carn Goedog for cosmogenic dating of exposed stone surfaces thought to be the result of prehistoric quarrying.

Geophysical survey at Pensarn

Magnetometry and earth resistance survey were undertaken in the fields surrounding the Bronze Age kerb cairn at Pensarn. Survey focused on fields known to contain mounds, and/or crop marks identified through aerial reconnaissance, associated fields where standing stones had been previously located on the historical Ordnance Survey mapping, and the location of relevant finds from the Historic Environment Record. Four circular features were identified in the fields directly west of the mound at Pensarn. The most significant of these was a large ditched enclosure with an internal bank, and entrance on the west side. This feature, along with three smaller ditched enclosures adjacent to it, are thought most likely to be associated with prehistoric activity in the area. In the fields to the east of Pensarn, significant features thought likely to be associated with Iron Age and Roman-period activity were also identified.

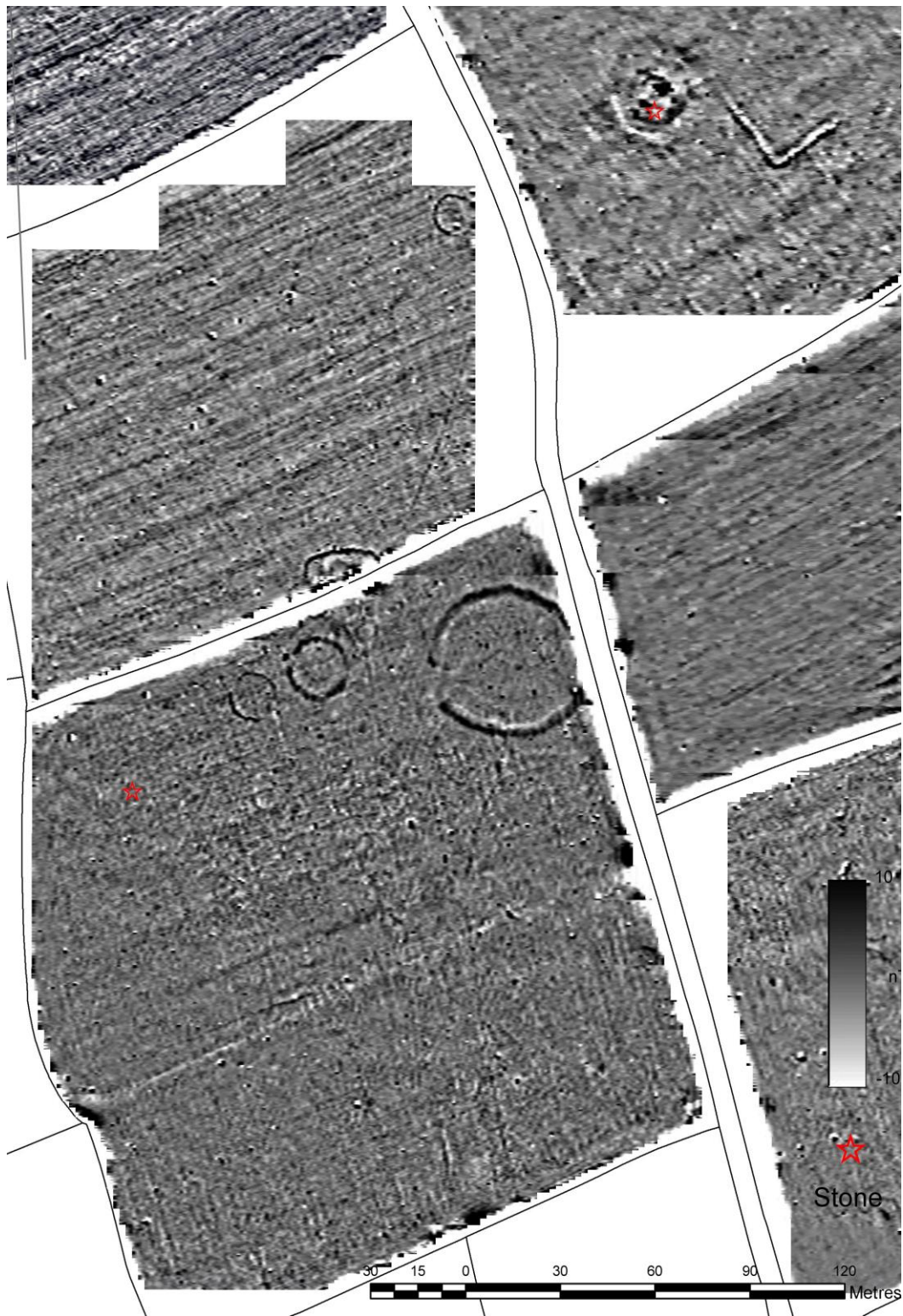


Figure 2. Greyscale plot of enhanced (de-stripped, clipped and interpolated) magnetometry data from Pensarn superimposed over a base OS map (1:1,500). The Pensarn mound is at the top right.

Excavations at Carn Goedog

Carn Goedog has been considered as a close match for Stonehenge's spotted dolerites for many years (Thorpe *et al.* 1991; Ixer 1996; 1997; Williams-Thorpe *et al.* 2006) and was finally confirmed as the dominant source of Stonehenge's spotted dolerite bluestones in 2013 (Bevins *et al.* 2013). Carn Goedog was the source for Stonehenge's spotted dolerite monoliths 33, 37, 49, 65 and 67 (Bevins *et al.*'s Group 1), and possibly also for monoliths 34, 42, 43 and 61 (Group 3). Monoliths 45 and 62 (Group 2) are of unspotted dolerite and are likely to have come from Carregmarchogion, a mile to the southwest of Carn Goedog.

Previous excavations in 2014-2015 against the south face of the outcrop, centred on SN12873315, revealed a variety of human-made features and dateable charcoal. Fourteen radiocarbon dates were obtained in 2015 from carbonised roundwood samples demonstrating a range of activity in prehistory and the historical period, from the Early Mesolithic to the modern period. The earliest layer against the base of the outcrop from where dolerite pillars have been removed is associated with a platform of split and laid slabs and is dated by three determinations to 3350-3040 cal BC during the Middle Neolithic, similar in date to a Neolithic occupation layer at Craig Rhos-y-felin (Parker Pearson *et al.* 2015).

In 2016, the previous trench area was enlarged to create a large area, up to 15m E-W x 17m N-S. The aims were to further investigate features and deposits identified in 2014-15. These included:

- The stone platform and sediments underneath it;
- A stone-filled ditch (11m x 2m wide x 0.4m deep) running east-west, to the south of the platform;
- A layer of spread sediment (presumably upcast from the ditch) along the south side of the ditch;
- A rectilinear array of small pits containing small stone orthostat pits forming a southern and western perimeter for the upcast sediment;
- A buried soil which contained prehistoric artefacts.



Figure 3. The excavation of Carn Goedog in 2016 (north is at the top)

About 40 stone artefacts were recovered from the prehistoric layers at Carn Goedog. They include stone wedges, hammer stones, flaked and retouched stones, and struck flint and quartz lithics. Six of these artefacts are identified as stone wedges on account of their wedge-shaped sections and their battered blade edges, as well as evidence for battering on the proximal end and for longitudinal scrape marks. Their shapes and patterns of wear are consistent with being used to enlarge the fissures between dolerite pillars.

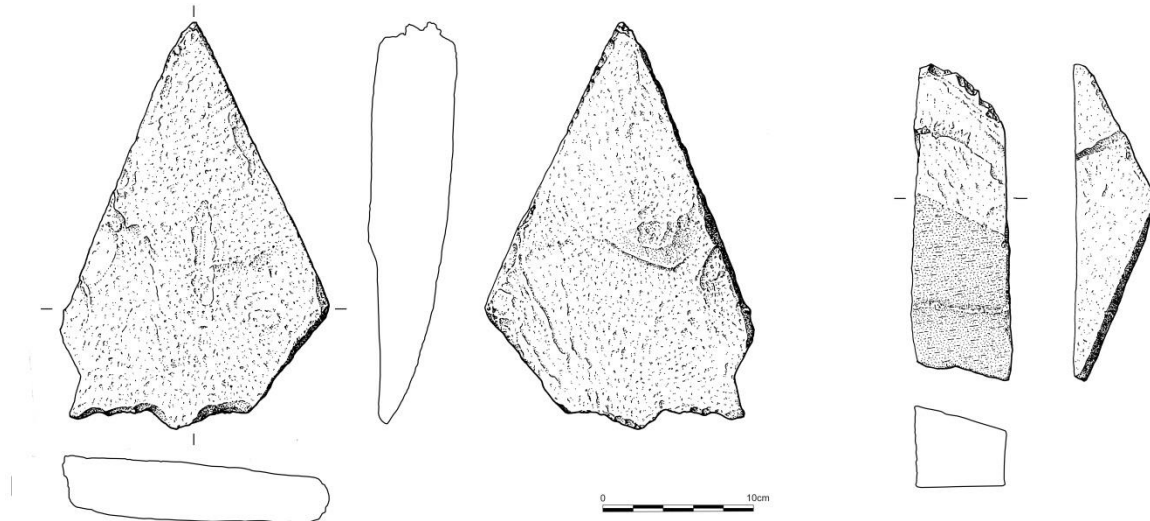


Figure 4. Examples of wedge-shaped stone tools found at Carn Goedog; one is from the spread upcast sediment beside the ditch and the other is from a pit dug into that sediment (drawn by Irene Deluis)

Environmental samples were taken from many of the excavated deposits for flotation, in order to extract carbonised wood and plant remains for archaeobotanical analysis and radiocarbon-dating. Column samples were taken of sediments including buried soils, ditch fill and upcast sediment for soil micromorphological analysis to determine how these sediments had formed and to provide samples for pollen analysis.

The numerous stone artefacts recovered from the area in front of the outcrop, coupled with the evidence for monolith extraction, further confirm prehistoric activity on this outcrop. In 2016, excavation was focused on establishing the full dimensions of the stone-filled ditch and obtaining suitable quantities of carbonised Roundwood for radiocarbon-dating of its fills. Samples for dating were also taken from the sediment deposited beneath and around the stone platform against the north side of the outcrop. A line of small features was found to be cut into the southern edge of the spread of upcast sediment from the ditch. Several of these small pits contained small stone orthostats and some wood charcoal. Other features in this outer zone were more likely of natural origin.

Excavations at Pensarn mound

This is a 1m-high, 27m-diameter circular mound at Pensarn (SN124359), found in September 2015. An L-shaped trench of c.240 sq m was excavated across the mound to investigate its full dimensions from southeast to northeast, including the mound's central area. Topsoil was removed by mechanical excavator, and the rest of the deposits were dug by hand.

Within the first few days of excavation it became clear that this prehistoric monument was not a Neolithic passage tomb but an Early Bronze Age circular kerb cairn, its shape altered by post-medieval robbing of stones from different parts of the cairn. A sherd of late medieval/early post-medieval glazed pottery was found in one of the stone-robbing pits. Whilst these robbing pits had destroyed parts of the cairn, they also afforded useful glimpses in their sides and bases into the full sequence of the monument without our having to dismantle it. Thus we could gain an understanding of its full sequence of construction and use with only minimal disturbance of its prehistoric structure.

Pre-cairn activity consisted of an episode of ard-ploughing on a north-south orientation under the centre of the initial 12m-diameter monument. Curiously, there was no trace of any such ard-marks within the preserved buried soil under the larger, 27m-diameter extension of the cairn. This suggests that ard-ploughing was limited to just the area of the initial tomb; as is known from Bronze Age burial mounds in western Europe, it is possible that this breaking of the ground was associated with designation of this spot as a place of burial rather than with possibly unrelated, earlier agricultural activity. The ard furrows were covered by a thin deposit of ashy, charcoal-rich sediment with small burnt stones.



Figure 5. Aerial view of Pensarn kerb cairn (north is to the left); the capstone of the cist can be seen in the centre of the cairn, and the Food Vessel Urn was buried under the edge of the inner cairn where the figure in red is kneeling

On the northeast edge of the extended cairn (27m-diameter), there was further evidence of pre-cairn activity in the form of a curving section of ditch which was only partly filled when the outer stone kerb was built across it (and thus not much older than the cairn). This curving ditch may have been part of a small penannular-ditched structure but its full size and character could not be established since much of it lay beyond the excavation trench. The intersection of the cairn's kerb and the penannular ditch was later marked by a small pit containing the stump of a snapped-off standing stone of rhyolite. Possibly it was placed here to mark the position of this earlier ditch because there was no trace of any other standing stones within the cairn's outer kerb.

A stone cist at the centre of the cairn may have been the first feature of this monument to be installed. It consists of five undressed rhyolite slabs forming the base and sides of a stone box in a square pit cut c.0.3m into the subsoil. Redeposited subsoil on its southeast side, lying on top of the ashy, charcoal-rich sediment, is probably upcast from this pit. The cist was capped by a large, round, undressed rhyolite slab. In the bottom of the cist lay a fragment of human femur. Despite the acidic nature of the soil, this unburnt bone had miraculously survived possibly because of its placing upon the stone floor of the cist. No other unburnt human remains were recovered so this fragment may be all that survives of an inhumation burial. The cist was filled with soil and small stones, amongst which were scattered fragments of cremated human bone and many small, abraded plain sherds of Bronze Age pottery deriving from at least three vessels. These are likely to be Middle Bronze Age Plain Ware, dating to c.1500-1200 BC, indicating that the cist was cleaned out and reused for burial some 500 years or more after it was built.

The scattered cremated remains in the cist belong to at least two individuals; their scattering throughout the fill could be the result of disturbance of one or more cremation burials within this cist by a later inhumation burial (c.1500–1200 BC) inserted into it with the capstone removed and then replaced.

The cist was placed in the southeast corner of a 2m N-S x 1.5m E-W structure which was surrounded by rhyolite slabs angled inwards, possibly once forming the base of a corbelled stone structure that would have enclosed the cist and its capstone. The initial cairn was constructed of rhyolite stones and lesser but significant quantities of white quartz stones set in a matrix of brown loamy topsoil. The blue and white colours of the stones would have given it an attractive appearance. Currently standing to 4-5 courses high, the kerb cairn may have once been twice that height at around 0.8m high, possibly surmounted by now-vanished layers of turf and soil.

Another burial feature which pre-dated the construction of the initial 12m-diameter cairn was located within the bottom of a stone-robbing pit under the kerb's northern edge. This consisted of a 0.35m-deep circular pit containing an upturned Early Bronze Age pot known as a Food Vessel Urn. Such pottery is known in many parts of Wales (Burrow 2011: 112-3) and elsewhere in Britain and Ireland. This urn contained cremated human remains and was protected within its pit by small rhyolite slabs. Its neck is decorated with incised horizontal lines separating rows of angled incisions in herringbone formation. The pot is currently undergoing conservation at UCL Institute of Archaeology.



Figure 6. The bottom of the kerb cairn's central cist; remains of an unburnt human femur can be seen beside the scale on the right and there are pottery sherds above the scale in the top left (north is at the top)



Figure 7. The Food Vessel Urn placed upside down; the last of its surrounding stone slabs is being removed (viewed from the north)

A rim sherd of a Food Vessel was found together with scattered cremated human remains in a large robber pit within the east side of the central cairn. Remnants of another Food Vessel Urn were found within the southeast part of the outer cairn, evidently broken before that deposit was incorporated into the enlarged cairn. Food Vessels and Food Vessel Urns date to c.2100-1700 cal BC (in the later stages of Beaker pottery and before or overlapping with later styles of Collared and Cordoned Urns). This was the period between stages 4 and 5 at Stonehenge, between the bluestones being rearranged into their final setting and the sarsens being carved with axe and dagger motifs.

On the northwest side of the initial cairn, a small flint barbed-and-tanged arrowhead was found in the upper fill of an oval pit. It is possible that this was a grave good in an inhumation grave dug into the top of the cairn but the acidity of the soil thwarts any attempt to establish whether the pit once contained a burial.

Pensarn's outer cairn was constructed after the initial cairn's kerb had begun to fall into disrepair, with tumbled stones – sufficient to comprise three or more collapsed upper courses – lying against the exposed face of the initial cairn. In contrast to the initial 12m-diameter cairn, this extended cairn was comprised of bands of stone, turf and topsoil. Different positioning of these materials in the southeast, northwest and northeast suggest that they were deposited not concentrically but in separate sectors around the cairn. The outer kerb on the south and southeast sides was better constructed than on the northeast side. Rhyolite was the main type of stone used for this enlarged cairn, with lesser quantities of quartz and just three waterworn boulders of spotted dolerite.

The size of the Pensarn kerb cairn is unusually large for Welsh Early Bronze Age funerary monuments, especially those in west Wales (for other excavated examples, see Poucher 2010; Hughes and Murphy 2013; Murphy and Murphy 2013; Schlee 2013). Its size compares well with a taller Early Bronze Age mound at Llanddyfnan on Anglesey, excavated over a century ago (Lynch 1991: 172-8), which contained nine cremation burials. Our excavation of Pensarn recovered remains of a minimum number of five individuals, likely to be a small proportion of those buried in the Pensarn cairn were it to be excavated *in toto*. The cairn's location is over 3 miles south of the nearest Bronze Age barrow cemetery at Crugiaiu Cemmaes (Crane *et al.* 2013), and it reveals that this area south of Crosswell, between several of Stonehenge's bluestone sources was a significant locale around 2000 BC. Its monumental form is also likely to be indicative of the important social and political status of the community that built it and whose members were buried in it.

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