A submerged forest, intertidal archaeology and a Bronze Age butchery site at Lionacleit. The story so far.

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Introduction

The submerged forest at Lùb Bhàn Lionacleit is the remains of a now lost landscape in this part of Benbecula. Intertidal and sub-tidal peat containing the evidence of once widespread woodland across the islands in the form of sub-fossil trees can be found all along the Atlantic coast of Uist and Benbecula. More than 20 sites have been recorded (Ritchie 1985), but residents of the Islands have told us about others, so this is certainly an under-representation of the actual number.

Lionacleit is special because there is also evidence of archaeological remains in the intertidal zone. They include a prehistoric quern-stone, the remains of a wall and possible buildings and a concentration of animal bone and quartz stone tools.

The site was brought to SCAPE's attention by Anne Corrance Monk in May 2016. SCAPE (Scottish Coastal Archaeology and the Problem of Erosion) has worked with local residents on community projects at archaeological sites threatened by erosion in the Western Isles for nearly 20 years. Intertidal archaeology is particularly vulnerable so we were interested in learning more about the remains before they deteriorated or were lost altogether.

In May 2018, working with Scott Timpany, palaeo-ecologist with UHI, and volunteers, we carried out a week-long investigation of the submerged forest and intertidal archaeology. During the project, every S1 and S2 pupil from the nearby Lionacleit School visited the site. Analysis is currently underway and the results being presented here are preliminary as research continues.

Fieldwork

The submerged forest

Intertidal peat has been investigated at Borve (Ritchie 1985; Whittington 1996), but other than a passing reference by Ritchie, the survival of the actual remains of the woodland had not been noted. Simon Davies mapped the extent of the peat from the headland of Sìthan Bhuirgh, eastwards over 500m to our Study Area (Figure 1). The peat survives between areas of boulder strewn bedrock platform, and is more or less visible depending on the covering of sand which comes and goes. From around 100m into the intertidal zone, erosion has revealed roots and branches of trees (Figure 2). We selected a representative sample area of 30m x 60m for detailed investigation of the tree remains and associated peat. Using baseline and offsets, volunteers mapped every visible wood fragment at a scale of 1:50 (Figure 3) to achieve a plan of the surviving remains. Pupils from Lionacleit School helped us visualise the density of the forest by standing on each tree stump to recreate the life position of the tree (Figure 4). A sample

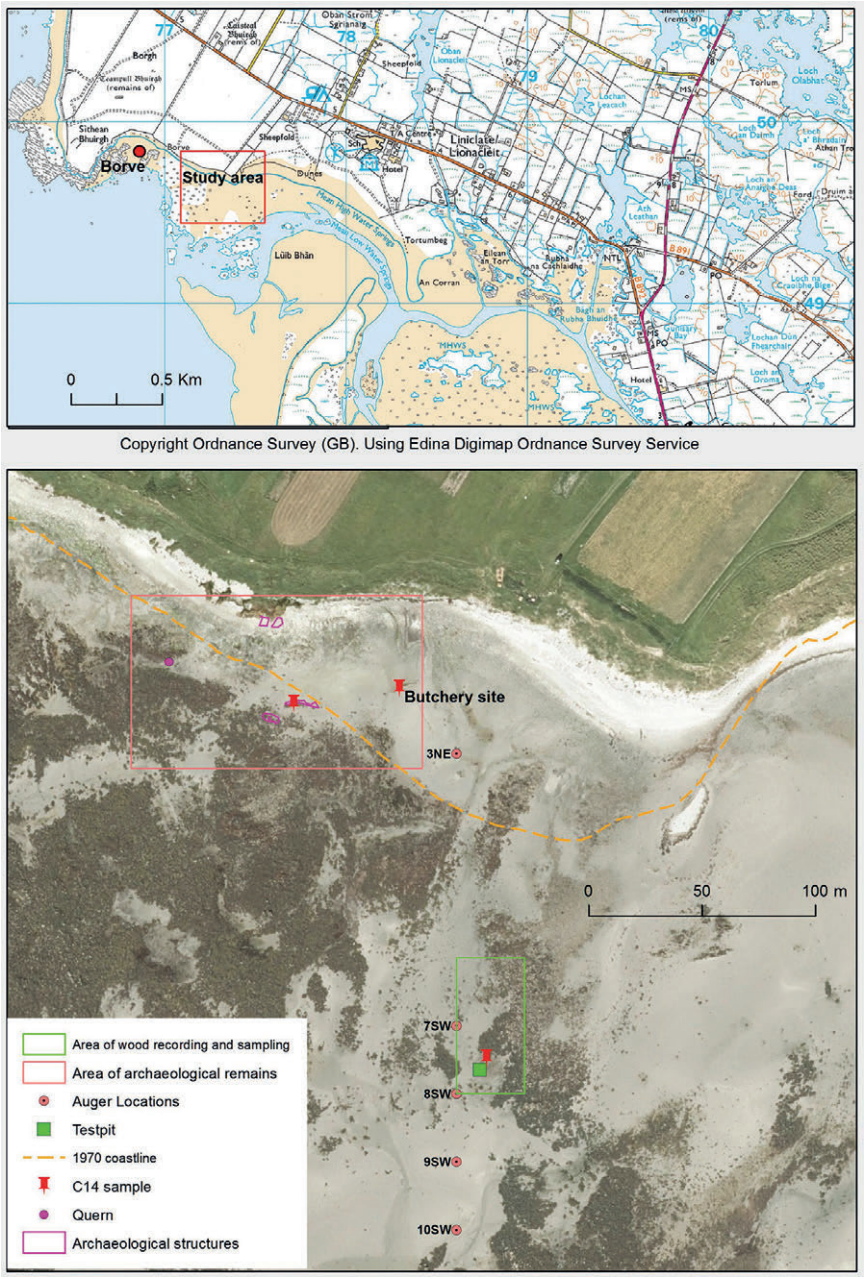


Figure 1: Site location and area of investigation

Figure 2: Sub-fossil wood in peat

Figure 3: Volunteers plan the preserved wood fragments

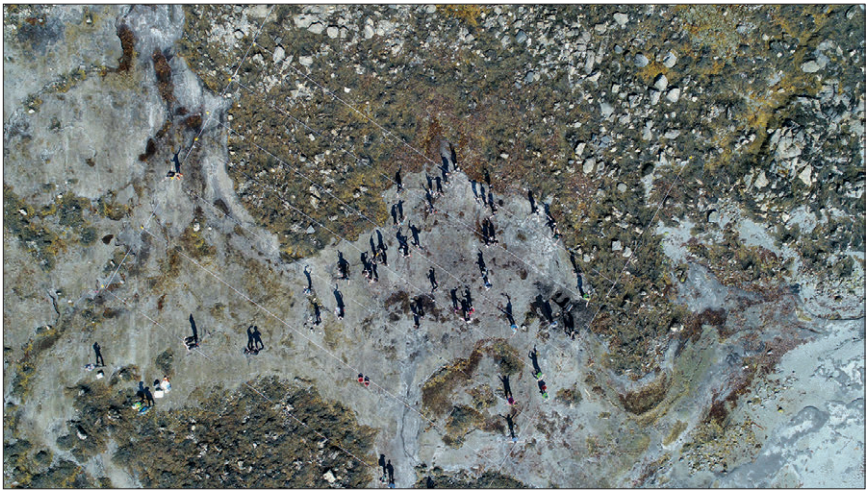


Figure 4: S1 and S2 pupils from Sgoil Lionacleit stand on each tree stump to help us imagine the woodland density

Figure 5: Taking a wood sample

was taken from every piece of wood for microscopic identification (Figure 5), much of which was carried out by volunteers using facilities in the UHI campus in Lionacleit.

We used a gouge auger to investigate the subsurface extent of the submerged forest layer and vertical sequence of deposits along a 200m transect, between the MHWS

and MLWS, and dug a test pit (1m x 1m x 0.5m) near to an exposed tree stump in order to try and recover seeds that could be used to identify the tree to species level. Wood identifications alone can only identify to family level. A monolith tin (0.5m x 0.2m x 0.1m) was taken through the peat and underlying sediments, which was then sub-sampled for pollen, non-pollen palynomorphs, e.g. fungal spores, waterlogged plant remains, e.g. seeds and buds, and radiocarbon dating samples. Bulk samples of 10 litres were taken contiguously through the sequence at intervals of 0.1m for the recovery of insect remains, e.g. beetles (cf. Smith et al. 2000).

Archaeological remains

Previously identified archaeological remains included a concentration of animal bone and quartz lithics (Figure 6), and a single quern stone (Figure 7). An unexpected discovery during the fieldwork was the realisation that other archaeological remains survived in the intertidal zone. These include a wall and the possible remains of sub-circular stone structures. We mapped all visible archaeological features using DGPS and drone aerial photography. Samples for radiocarbon dating were taken from peat beneath the wall. The peat bank within which previously identified bone and quartz tools were embedded was obviously rapidly eroding and so a rescue excavation recovered 100% of the surviving bone and lithic remains. A sample from the peat bank and an animal bone sample were submitted for radiocarbon dating.

Figure 6: The association of fragmented bone and quartz lithics before excavation. © Simon Davies

Figure 7: Prehistoric saddle quern

Results

The submerged forest

Radiocarbon dates returned from the sedimentary sequence show that the submerged forest is of likely Late Mesolithic to Early Neolithic age, with radiocarbon dates for the upper peat sequence being between 4043-3947 cal BC (SUERC-85852) and 6066-5931 cal BC (SUERC-85850) (Table 1 and Figure 8). These compare well to other dated tree remains in Uist, which have a date range of between 7179-6693 cal BC (Q-2681) to 2866-2465 cal BC (Q-2678) (Fossit 1996).

Table 1. Radiocarbon dating results

Laboratory Number	Sample depth (cm)	Material and Context	Radiocarbon Age (BP)	δ13C (‰)	Calibrated date (95% confidence)
SUERC-85852	4-5	Peaty SAND from the top of the peat sequence – erosional contact.	5170±30	-28.6	4043-3947 calBC
SUERC-85851	17-18	Sandy PEAT with wood fragments top of the submerged forest deposit?	5398±30	-28.4	4338-4084 calBC
SUERC-85850	49-50	Sandy PEAT with wood fragments base of the submerged forest deposit.	7141±30	-28.6	6066-5931 calBC
SUERC-85846	51-52	Peaty SAND with gravels, initial peat accretion.	7108±30	-28.5	6051-5914 calBC
SUERC-85843		Peat beneath intertidal wall	4659±30	-28.8	3519-3365 calBC
SUERC-85844		Peat associated with butchery site	3660±30	-29.7	2136-1950 calBC
SUERC-85843		Butchered animal bone (Bos sp)	3419±34	-21.3	1875-1627 calBC

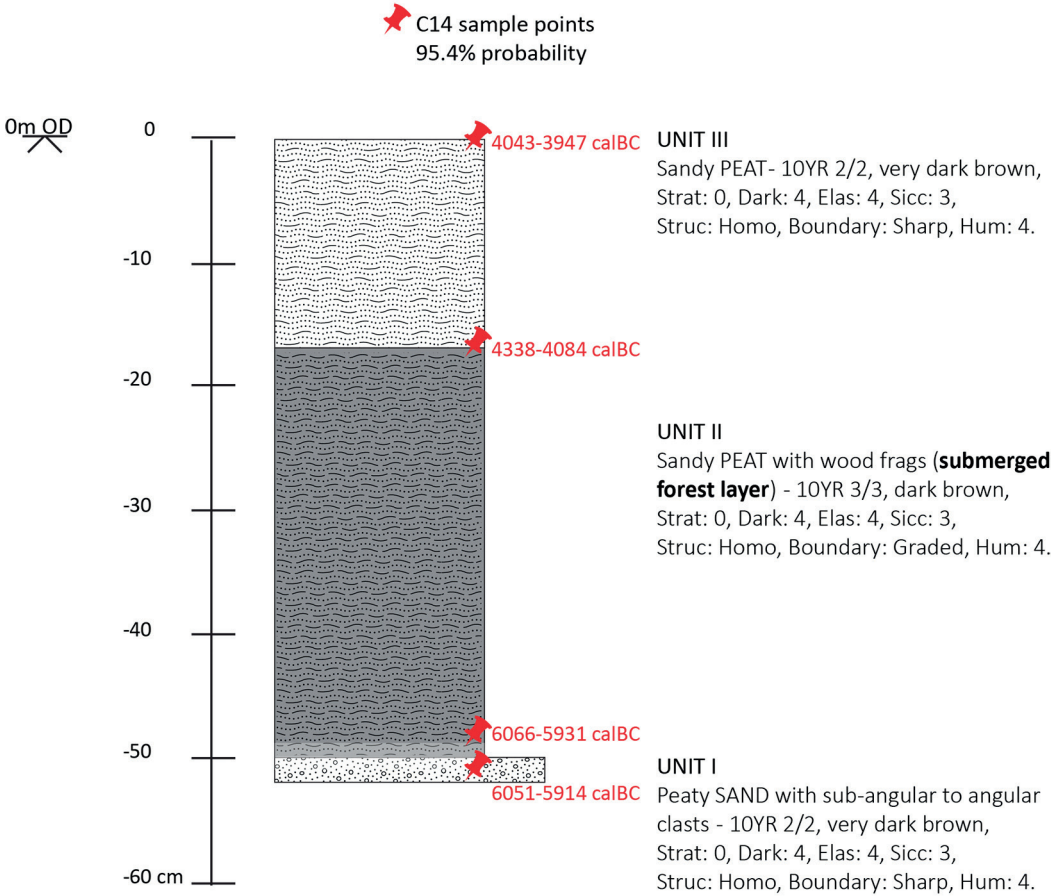


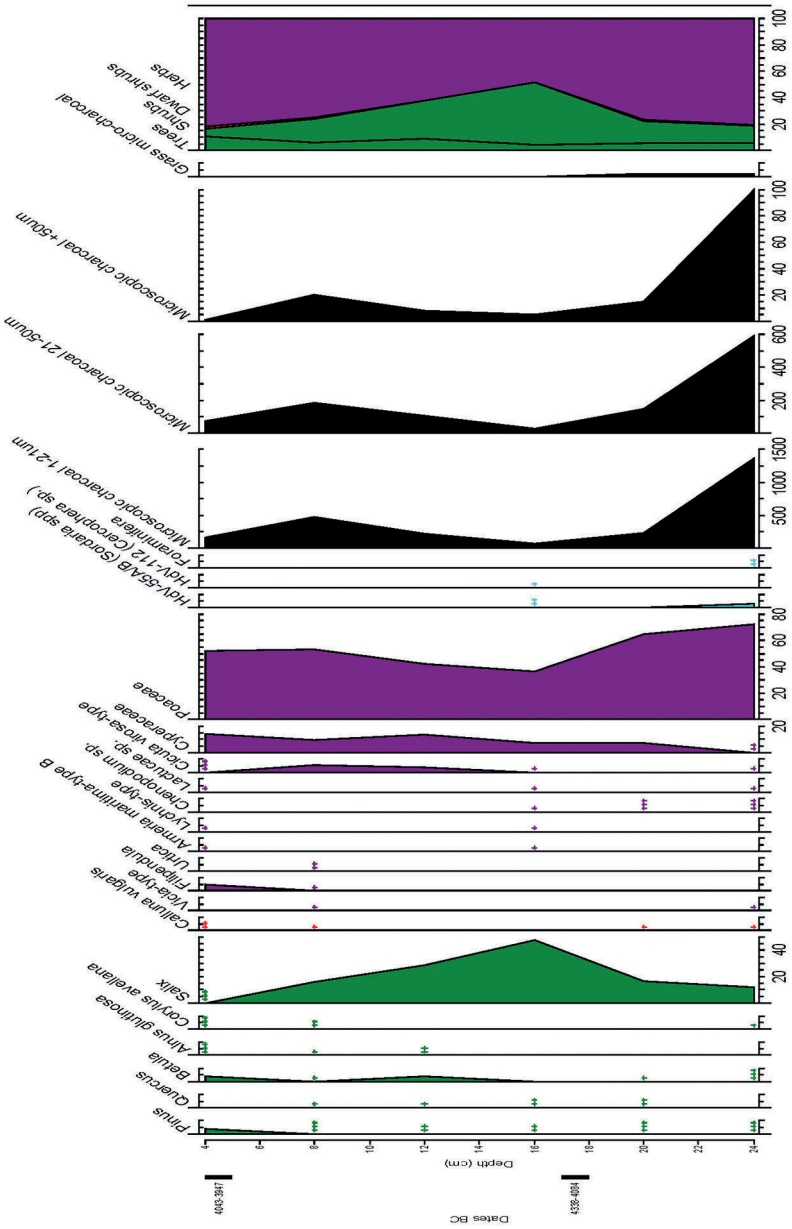
Figure 8: Test pit sequence and radiocarbon dating

Wood identifications of the tree-remains shows a predominance of willow (*Salix* sp.) (Figure 9) with presence of birch (*Betula* sp.) and Scot's pine (*Pinus sylvestris*). This is the first identification of birch and willow wood remains in Benbecula and the first recording of Scot's pine tree-remains in Uist with previous recordings of this tree in the Western Isles restricted to Harris (Fossitt 1996). The presence of pine suggests there were relatively dry patches within the woodland. This has been confirmed through the identification of *Amara* sp. beetle fragments in the upper part of the test pit sequence, an insect that usually inhabits open and dry areas such as woodland margins. Other woodland indicators have also been recovered in the beetle samples such as the remains of *Pterostichus strenuou*s, a woodland floor indicator.

Figure 9: Distinctive red of cut willow

Pollen has been assessed from the upper levels of the test pit (Figure 10) through counts of 100 Total Land Pollen (TLP). The assessment suggests that open, wet woodland predominantly of willow was established at Lionacleit by 4338-4084 cal BC (SUERC-85851), which was then increasingly invaded by birch. Pine pollen increases through the profile and is suggested to have been an established part of the woodland canopy by 4043-3947 cal BC (SUERC-85852). The pollen aligns well with the results of the wood identifications. The dominance of grass (Poaceae) pollen indicates this was relatively open woodland, supported by the presence of *Amara* sp. in the insect record. Sedges (Cyperaceae), meadowsweet (*Filipendula*) and cowbane sp. (*Cicuta virosa*-type) are also present within the field layer and indicate marshy ground. High ratios of microscopic charcoal at the base of the pollen diagram suggest a local burning event. Burning activity, possibly associated with Mesolithic communities, has previously been recorded in the Western Isles (e.g. Fossitt 1996; Ritchie et al. 2001; Edwards et al. 2000, 2005); while there is also archaeological evidence for the presence of Mesolithic populations in areas such as Harris (e.g. Gregory et al. 2005). This study adds to the growing body of evidence of Mesolithic people's impact on the landscape, with Edwards et al. (2005) even suggesting that Mesolithic burning could have had large-scale impacts on the vegetation leading to increased machair formation.

Figure 10: Pollen diagram of upper 20cm of test pit sequence



Archaeological remains

The archaeological remains in the intertidal zone are all located between 30m and 80m from the present coastline. At least two further tentative structures identified by Mary Harman, are eroding out of a vegetated section of the foreshore on the present beach (Figure 11). The archaeological remains owe their survival to their relatively recent exposure, following rapid erosion along this coastline. Figures 1 and 12 locate the position of the MHWS in the 1970s. They show that less than 50 years ago the animal bone and lithics were buried beneath machair and the possible stone structures were located circa 7m below MHWS. Today they lie more than 60m seaward of the MHWS.

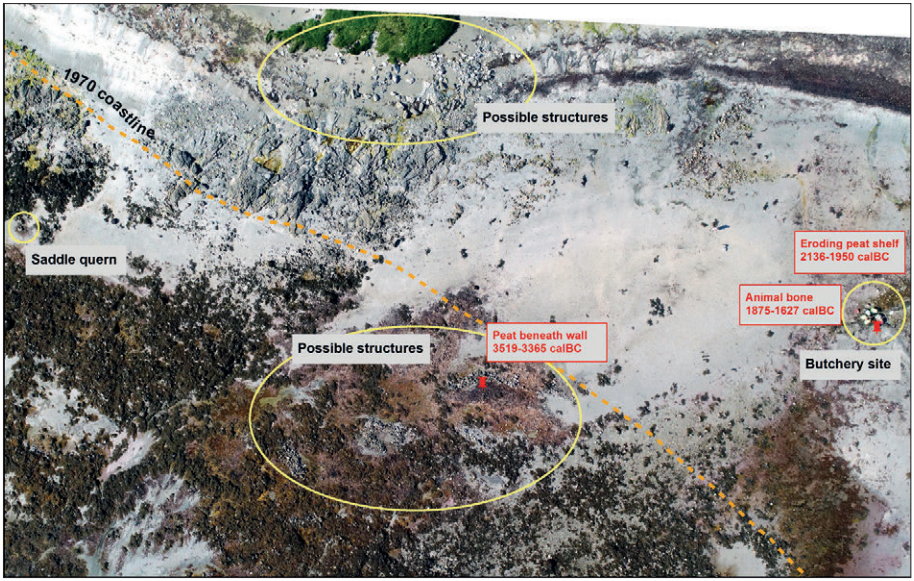


Figure 11: Detailed aerial view of archaeological features and associated radiocarbon dates

The structures

The possible stone structures comprise a 16m length of sinuous walling with at least two short stretches of perpendicular walling along its north side; one sub-circular ring of stone, circa 4m in diameter and a further short length of stone of circa 5m x 1.8m. Further seaweed clearance may reveal more possible structures. No associated archaeological deposits survive. The stone structures rest unconformably upon sand covered peat. A radiocarbon sample from peat beneath the wall returned an early Neolithic date of 3519-3365 cal BC (SUERC 85843). This gives a terminus post quem for the wall which is likely to be later in date. The single saddle quern (0.5m x 0.5m x 0.5m in size), first recorded by Kate MacDonald and Anne Corrance Monk lies stranded in the intertidal zone around 50m west of the possible structures and 40m from the current shoreline.

SCAPE has identified and recorded a number of similar drystone structures to these in intertidal areas of the Western Isles and Shetland. In some cases, a landward portion of the structure survives so we can be more certain of their archaeological origin. Once in the intertidal zone, soft sediment is rapidly eroded and the stone structure settles gradually onto a resistant surface, retaining its form but rarely any associated deposits. The coincidence at Lionacleit of the saddle quern and the animal bone and quartz lithics makes it highly likely these are archaeological remains, possibly fragmentary survivals of prehistoric field systems and settlement.

Animal bone and lithics

(Based upon analysis by Catherine Smith, Mary Harman and Torben Bjarke Ballin).

Except for one water-rolled shaft of a small ungulate (probably sheep/goat), all of the animal bones were of cattle and were from the same individual. Several bones from the right forelimb articulated with one another. Further parts of the skeleton represented were skull and horn core fragments, mandibular ascending ramus and loose upper and lower teeth, a complete left scapula, right distal humerus and humerus fragments, left ulna, right innominate (pelvis), right femur, left astragalus, a single third phalanx (foot) and several ribs.

Tooth wear indicates the animal was mature; under modern conditions probably categorised as being over five years old. Based upon metacarpal measurements, he or she was of small stature, standing at around 110cm.

A significant feature of the bones is the presence of numerous cut marks. Groups of parallel cut marks are present on the skull, mandible, scapula, humerus and upon long bone shaft fragments, which have themselves been chopped in antiquity (Figure 12). A chatter mark probably resulted from a tool skidding along the bone surface. The ribs are covered in multiple long scratches along the ventral surface, suggesting a scraping action along the length of the bone.

Figure 12. Knife cut marks on chopped bone

The ‘smoking gun’ for the cut marks is the close association of twenty-nine freshly struck quartz lithics, a number of which were found in direct contact with the bone (Figure 13). The lack of cortex and rough surface of the quartz indicates it was procured from local veins rather than from beach cobbles. Many pieces had a distinctive colour combination of a blueish-grey centre becoming white towards the surface, suggesting they were struck from the same nodule or nodules derived from the same vein. Most of the assemblage is debitage (seven chips and twenty flakes) whereas two are tools; a side scraper and one piece with edge retouched.

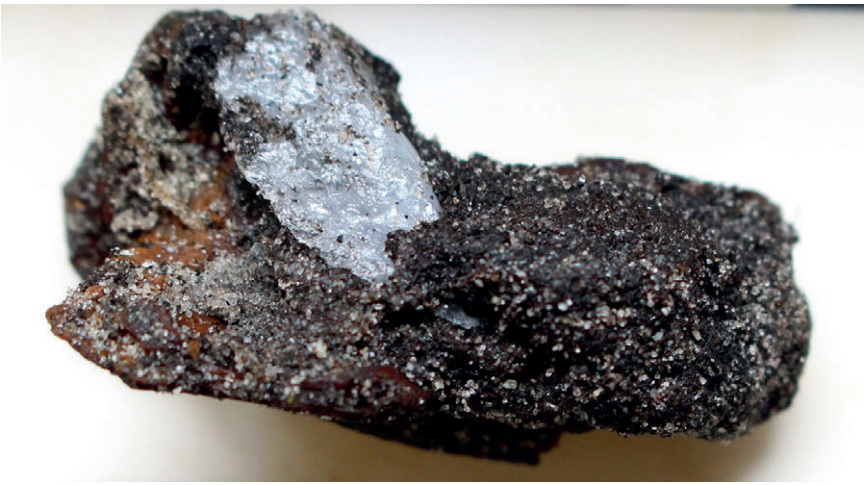


Figure 13. Small bipolar flake fragment found in direct contact with fragment of animal bone

It is likely, that the flakes and flake fragments were expedient knives used for butchering. The edge-retouched piece may have been used for more robust work such as scraping the bones clean or cutting grooves into the bones to split them for marrow. A radiocarbon date returned from a sample of bone show the animal died in the Early Bronze Age between 1875-1627 cal BC (SUERC 85845). This is consistent with a Late Neolithic/Early Bronze Age date of the peat shelf from which the animal bone and struck lithics were eroding, radiocarbon dated to 2136-1950 cal BC (SUERC 85844).

The close association of a tool assemblage directly relatable to butchery marks on a single individual makes a compelling case for the interpretation of the remains as a specialist deposit relating to the butchery of an animal. It is an extremely rare chance-survival of a single action in prehistory preserved in the archaeological record – a moment frozen in time. The only other example of a similar find in the region is from Skaill Bay, Mainland Orkney where coastal erosion in 1992-3 exposed faunal remains, mainly of red deer, closely associated with large quantities of Skaill knives representing a Late Neolithic butchery site; possibly an off-site butchery area for the nearby settlement of Skara Brae (Richards et al. 2015). On Sanday, Orkney, an articulated cattle skeleton bearing a few cut marks relating to primary butchery

was discovered on the surface of a midden at Tofts Ness, and animal bones from the Neolithic midden at Pool were frequently found in articulated groups with evidence of butchery, but not as whole carcasses (Dockrill 2007: 195-201). Neither of these had associated lithics and both were recovered from midden contexts.

The fragmentary and isolated survival of the butchery site at Lionacleit makes it difficult to infer the context in which the activity took place, although the absence of other archaeological material suggests, like at Skaill Bay, it could have been an off-site activity. The lithic assemblage and the cut marks do tell us something about the decision making processes, technology and skill of the person/people who made the tools and processed the animal. It would appear that nodules of raw material were brought to the animal and struck 'on the fly'; that unmodified flakes were employed as single-use knives, discarded, along with at least two tools when the job was done. Whether or not they lived in the wider settlement hinted at by the saddle quern and stone structures we will never know.

Conclusion and final remarks

Preliminary results of investigations of intertidal peat and archaeological remains at Lionacleit have revealed an early prehistoric woodland landscape, a late Mesolithic charcoal spike which could relate to the presence of the earliest people here, fragmentary walls of prehistoric settlement and a possibly unique Early Bronze Age butchery site. They lie in the intertidal zone because of coastal erosion, which since the 1970s alone has stripped away between 30m to 90m of machair within the study area.

These remains, hiding in plain sight until noticed by local residents, demonstrate the potential of the coastal and intertidal archaeological resource in bringing the distant past to life. The circumstances of discovery and ensuing investigation highlight the critical role of the local community in monitoring coastlines for inevitable further exposures of archaeology along the dynamic shorelines of Uist and Benbecula.

Acknowledgements

We would like to thank all the volunteers who made this project so enjoyable and productive. A big thank you to Caitriona MacCuish, Museum Development Officer at Museum nan Eilean for helping us with just about everything and to the staff and S1 and S2 pupils of Sgoil Lionacleit for bringing the forest to life.

Thanks to Lews Castle College UHI Benbecula campus who generously provided us with the use of their classrooms and facilities.

A special thank you to Anne Corrance Monk and Simon Davies for bringing the site to our attention and for continuing to keep an eye on it.

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