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The Moon and the Bonfire.

An Investigation of Three Stone Circles in North-East Scotland

Richard Bradley

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Chapter 2

EXCAVATIONS AT TOMNAVERIE

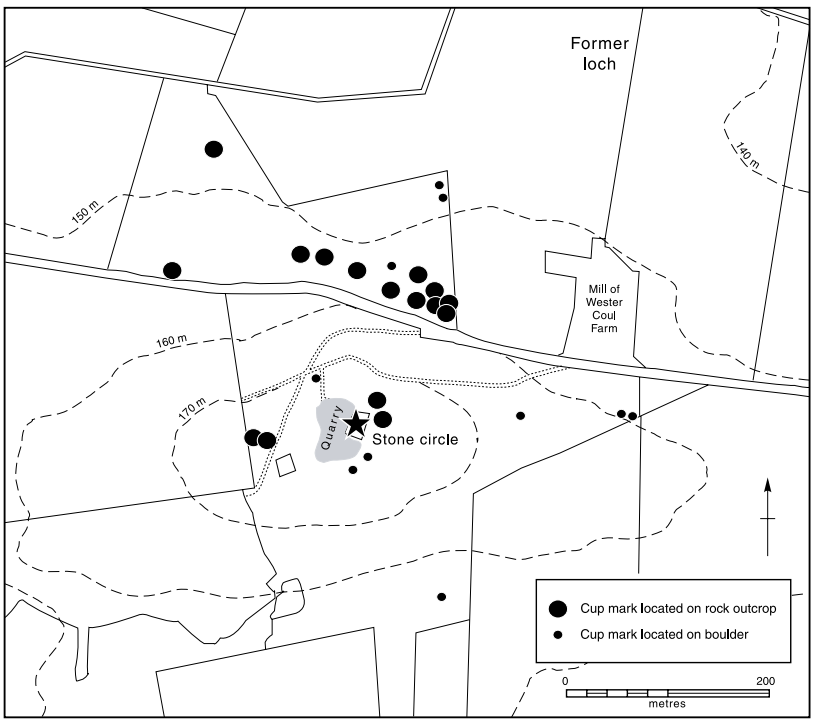
Richard Bradley and Tim Phillips

with contributions from Sharon Arrowsmith, Chris Ball, Angela Boyle, Peter Brewer, Donald Davidson, Stephen Lancaster, Brian Matthews, Alison Sheridan, Ian Simpson and David Trevarthen

2.1 BACKGROUND

The recumbent stone circle at Tomnaverie (illus 5, no 1) was located on the end of a granite ridge in the centre of the basin known as the Howe of Cromar (NJ 486034). The ridge is quite inconspicuous, although the monument can be identified on the skyline from much of the surrounding area. The site commands an all-round view which takes in almost the full extent of the basin and extends deep into the higher ground as far as two conspicuous mountains: Morven, 11km to the west, and Lochnagar, which is 30km to the south-west. The site was at the junction between two different environments. On three sides the land is fertile and large areas are cultivated, but to the west the soils are significantly poorer. Just below the monument is the site of a loch drained in the 19th century (illus 6).

Three kilometres south of Tomnaverie is another loch, Braeroddach Loch, where Edwards and Rowntree (1980) have studied the local environmental sequence. Small-scale clearance began towards 4000 BC. A similar episode occurred in the first half of the third millennium and more substantial episodes followed in the Later Bronze and Iron Ages. The latter were associated with

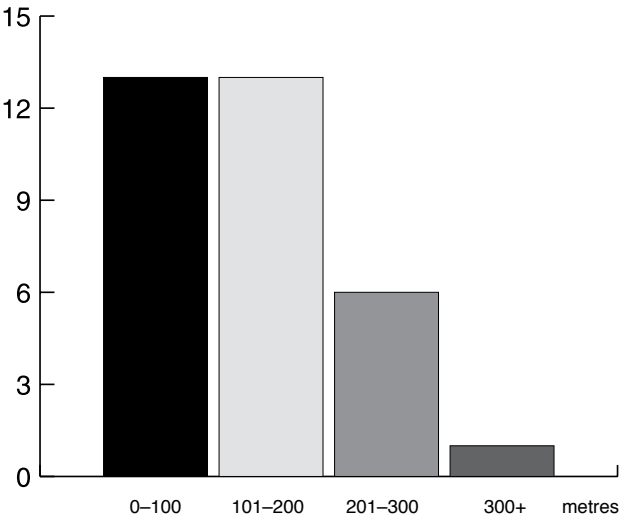


6 The surroundings of Tomnaverie stone circle, showing the distribution of cup-marked rocks, the extent of the modern quarry and the position of the former loch.

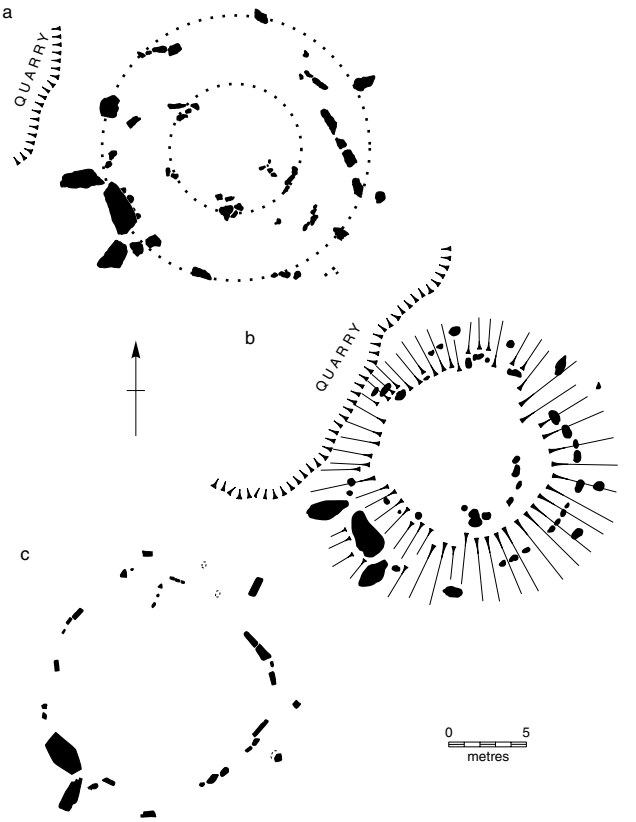
cereal cultivation and may be contemporary with a series of field systems and house foundations on the higher ground. These extend as far as the stone circle but respect the monument itself. Further to the north of that site there are records of cists and the remains of at least two more stone circles.

The ridge rose to a steep bluff where the quarry was established. The monument was located on the hilltop where the ground fell away to the north, west and the south. It was approximately level with the area to its east. As a result, it cannot be seen from quite large parts of the hill, only appearing as a prominent landmark as visitors approach the summit. Much of the lower ground is under the plough, but two extensive areas still remain in pasture. It is here that a network of older field walls and enclosures still survives. Work in 2000 located 29 cup-marked stones in this area (illus 6). The majority were large boulders which may have been disturbed when those fields were in use. Even allowing for the effects of quarrying, the decorated stones appear to increase in frequency towards the position of the monument (illus 7). There may also be a concentration of cup-marked rocks on the approach to the site from the north-east. That axis leads to the valley floor and the site of the loch. A number of these carvings are in a line running parallel to the modern road and seem to follow the course of a granite outcrop.

The quarry was established in the late 19th century and was an important source of road metalling until it closed in the 1920s. It is clear



7 The distribution of cup-marked rocks at Tomnaverie by distance from the centre of the stone circle.

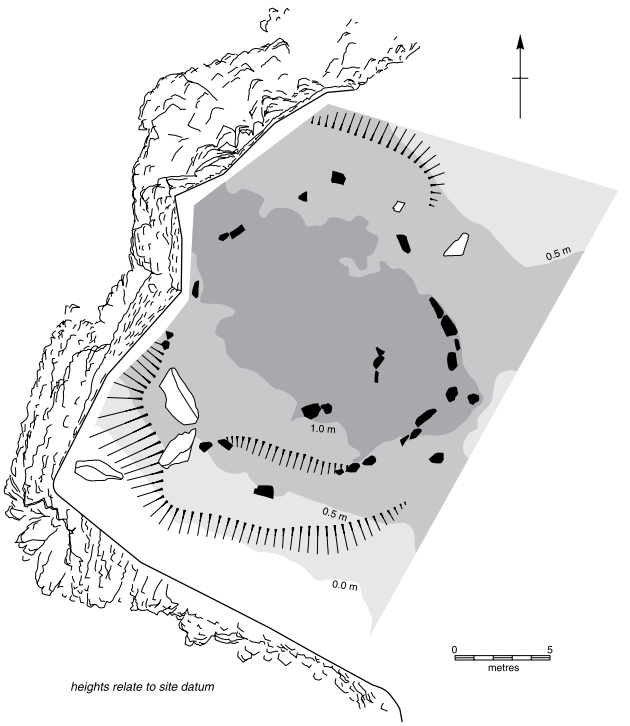


8 Successive surveys of Tomnaverie stone circle. a: Coles (1905); b: Ogston (1931); c: Thom (Thom, Thom and Burl 1980). Note how the quarry had encroached on the monument after the time of Coles's survey, removing one of the monoliths. Between the time of Ogston's survey and that by Thom one of the fallen flankers had been moved.

that the damage extended to the very edge of the monument, with the result that individual stones had been removed. Some of these changes may have been intended to prevent accidents. The recumbent stone (which weighs 6.5 tons) was taken away from the quarry edge and the two flankers (which weigh 2.5 and 3.5 tons respectively) were uprooted from their sockets. The monument was protected by taking it into Guardianship. No attempt was made to re-erect the stones that had been moved, but the surface vegetation was cleared and the site was put down to grass. Then the remains were enclosed by a fence.

2.2 THE STANDING MONUMENT

Three surveys of the monument had been carried out before the present campaign of fieldwork, by



9 Plan of the stone circle at Tomnaverie before excavation.
(*Plan by courtesy of HES, Crown Copyright*)

Coles (1905, 208–14), Ogston (1931, 93–5) and Thom (Thom, Thom and Burl 1980, 210). All the records agree in their basic details (illus 8), although Coles shows the position and profile of a monolith which has since been lost and Thom omits one of the flankers. Surviving photographs also show one of the standing stones before it was taken down.

These records were supplemented by a survey undertaken by the Royal Commission before the 1999 excavation. Their work drew attention to a number of features of the monument which had not been discussed before and had a significant impact on the planning of the fieldwork (illus 9). The monument had two main components: a cairn, defined on the exterior by sections of a substantial kerb; and a stone circle, with four standing monoliths and three or four others which had fallen or been moved. The spacing of these uprights suggested that several more were missing. There was also the recumbent stone which lay on its side so that the upper surface faced into the interior. The outer kerb of the cairn defined a circular space approximately 15m in diameter but this opened out towards the south-west to join the positions of

10 The remains of Tomnaverie stone circle after the stripping of the turf.
(*Image courtesy of the Jim Henderson Collection, Aberdeenshire Council Museums Service*)

11 The remains of Tomnaverie stone circle after stripping and initial excavation.

the flankers. Outside this ring of uprights was the earthwork of a ramp which was most obvious to the north-east and south-west. Several blocks of stone on the surface of the monument were interpreted as the remains of an inner kerb, but now it seems as if they had been cleared off the nearby field. There were cup marks on the recumbent stone, one of the flankers and on the kerb of the internal cairn.

2.3 THE DESIGN OF THE EXCAVATION

The excavation was planned in two stages. The first was to strip the whole of the surviving monument and to plan it in detail. Having decided where there was most chance of establishing a structural sequence, this was to be investigated on a small scale. Another objective of this work was to look for deposits which might provide dating evidence.

The monument proved to be better preserved than anticipated. Beneath the turf a substantial cairn remained and it was possible to locate many of the kerbstones which had not been visible on the surface (illus 10 and 11). The same applied to one of the 'missing' monoliths. The central area of the monument contained a rather disturbed area of smaller stones through which patches of burnt material could be seen. The removal of the surface cover also made it clear that the external ramp was a substantial feature extending out from the ring of monoliths for approximately four metres. Indeed it went beyond the perimeter fence that defined the apparent limits of the monument. The entire structure was 23m in diameter, compared with a previous estimate of 17m.

Given the size of the monument, the entire area was recorded using photogrammetry and the digitised plan was then checked according to a series of ground controls. This provided a stone-by-stone drawing of the entire structure which work in the second season confirmed was metrically accurate (illus 12). The saving of time in the field was immense. The photographic survey occupied an hour and half compared with conventional procedures which would have taken a week or more.

The resulting drawing formed the basis for the next two stages of analysis. The plan was checked on the ground and details of stone colours, raw materials and visible alignments were recorded together with any traces of charcoal or cremated

bone. These features helped to suggest where stratigraphic relationships could be investigated.

At first it seemed as if the monument had three components: an outer platform, a recumbent stone circle and a well preserved ring cairn (illus 13–16). The excavation was planned on this premise, although in the event the inner kerb did not materialise.

At this stage the work had three main objectives. First, a narrow section was excavated beneath the original position of the recumbent stone, which had been moved during the operation of the quarry (Trench 3, illus 17). This procedure could not have been used on a well preserved monument, although Childe had somehow managed to tunnel underneath the recumbent stone at Old Keig (Childe 1933). Our work investigated the rubble foundation beneath this feature and the natural surface on which it had been built. The second objective was to investigate the stratigraphic relationship between the kerb of the ring cairn and the external ramp on which two of the monoliths

12 The surviving remains of Tomnaverie stone circle after initial planning.

13 The perimeter of Tomnaverie stone circle showing the position of the modern quarry.

14 The southern perimeter of Tomnaverie stone circle showing the remains of the external rubble platform. (*Image courtesy of the Jim Henderson Collection, Aberdeenshire Council Museums Service*)

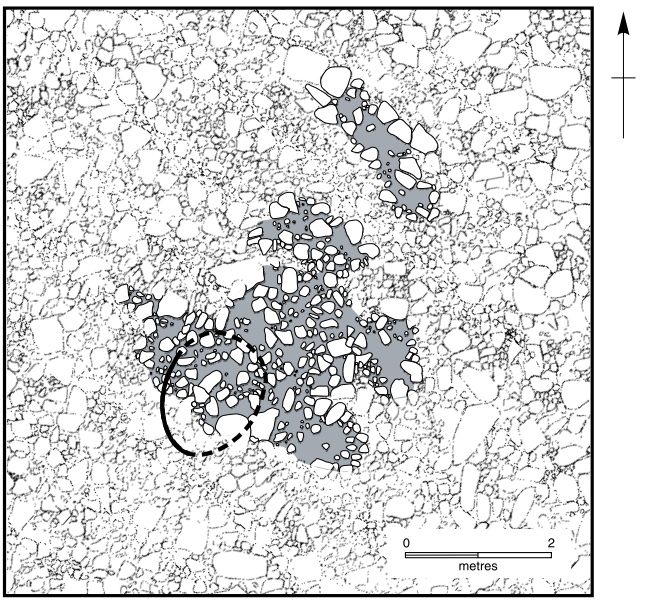
seemed to be standing (Trenches 1 and 7). Lastly, a more extensive section was excavated to the centre of the monument (Trench 7). This also incorporated one of the kerbstones which remained *in situ*. The trench took in 20% of the central area of the monument, where we had expected to find an internal kerb.

Two further objectives were added to the programme during the second season. Once some of the sockets for the monoliths had been found, larger areas outside the cairn were investigated (Trenches 2, 4, 5, 6, 8). This procedure revealed

15 Detail of the rubble platform showing the position of one of the displaced flankers.

16 The north-east perimeter of Tomnaverie stone circle showing the positions of a stone socket and two fallen monoliths.

17 The parts of Tomnaverie stone circle examined by detailed excavation. The numbers in bold refer to the trenches and those in italics to the monoliths.



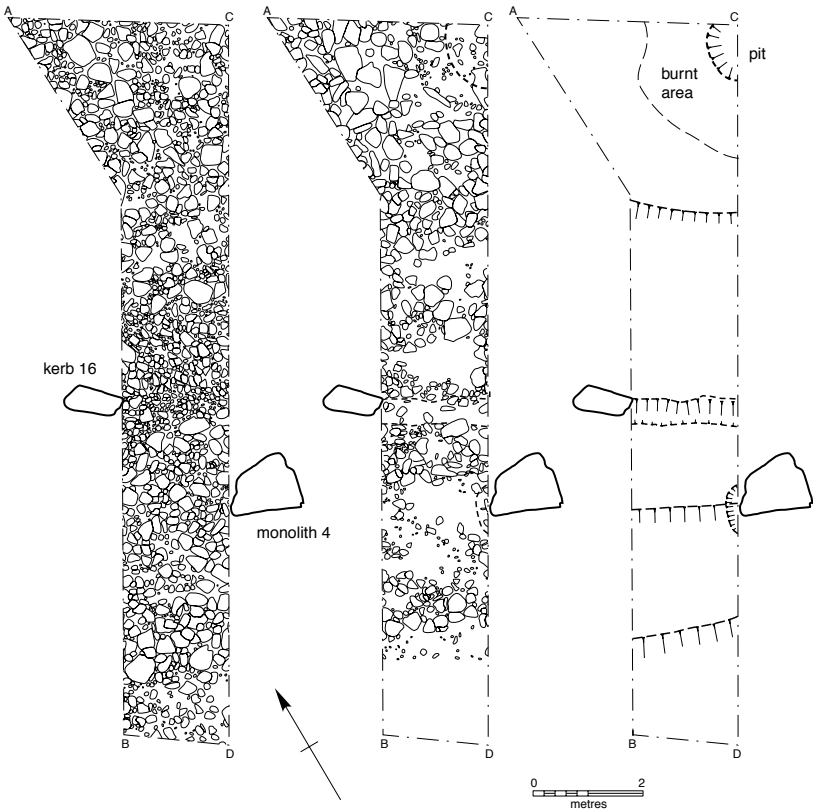
18 The central area of the platform cairn at Tomnaverie showing the surface evidence of burning (shaded) and the position of the central pit. Only the part of the pit defined by a continuous line was excavated.

the sockets for both the flankers and those for three other stones, although one example on the edge of the quarry was not excavated further. Lastly, it became clear that the 'missing' lengths of kerb were marked by a trench filled with loose topsoil which resulted from the removal of large upright stones. This was excavated in its entirety.

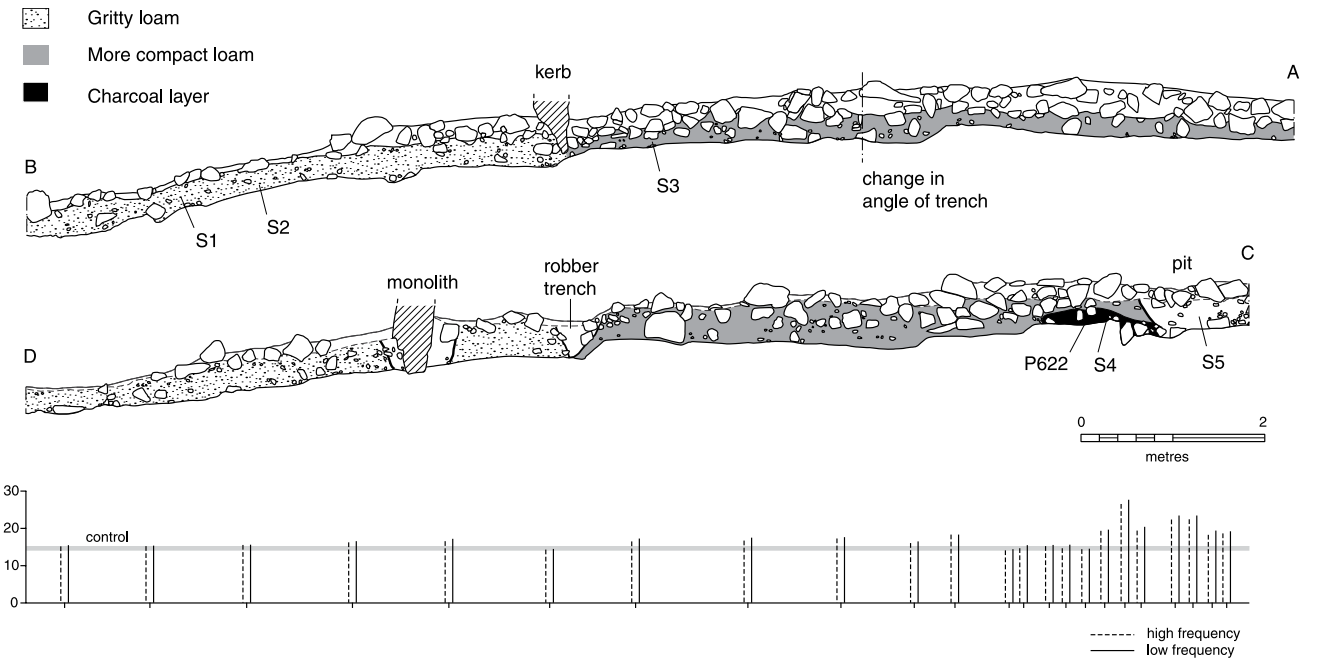
2.4 THE STRATIGRAPHIC SEQUENCE

2.4.1 DEPOSITS PREDATING THE PLATFORM

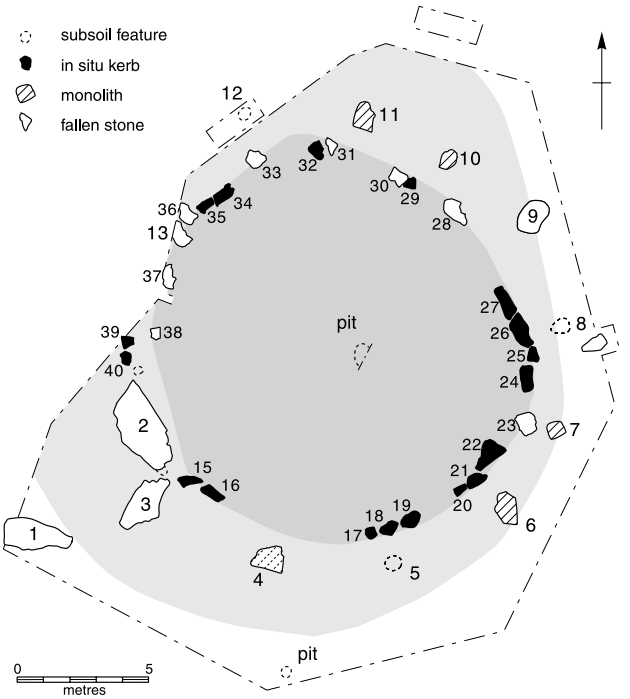
The interior of the monument preserved an old land surface covered with a deposit of burnt soil, finely comminuted charcoal and small fragments of cremated human bone (illus 18). Part of this deposit had been cut by a later pit, but its outer edges were sealed by the material of the cairn. The burnt material formed a low mound up to 20cm high and may have extended across an area about 3m in diameter. This deposit probably developed *in situ*. A transect taken from the outer edge of the monument to its centre revealed an increase in magnetic susceptibility towards the summit of the hill. Again the area with the highest values underlay part of the monument (illus 19 and 20).



19 The stratigraphic sequence in Trench 7 at Tomnaverie. The left-hand plan shows the surface after stripping. The middle plan shows the banks of rubble in the lower level of the monument, and the right-hand plan shows the features defined on, or in, the natural subsoil.



20 Sections through the cairn and stone circle in Trench 7 at Tomnaverie. Their positions are indicated in illus 19. S1–5 indicate the positions of soil samples and P 622 shows the position of the pollen samples. The vertical bars along the base of the drawing record the magnetic susceptibility of the buried soil along the course of the trench.



21 Numbering of the monoliths and kerbstones at Tomnaverie.

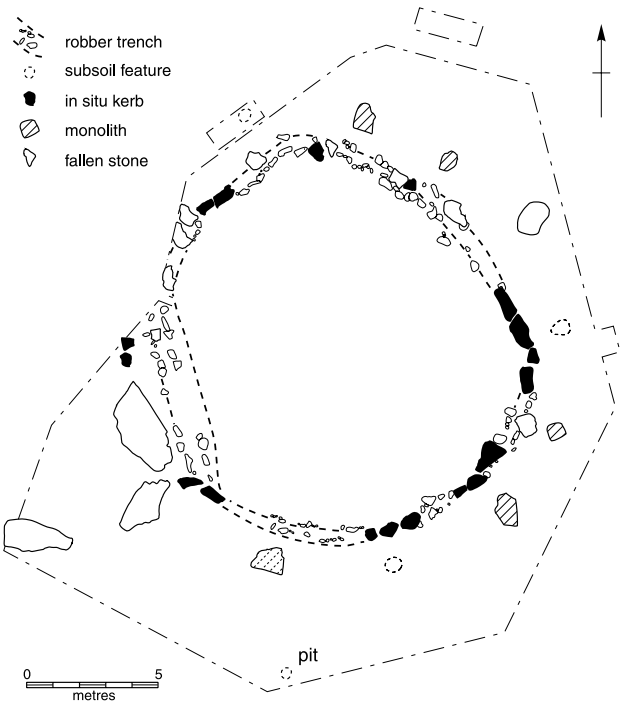
Having said this, it is clear that burning took place intermittently during later prehistory and again in the post-medieval period. This is shown by a series of radiocarbon dates. The loose material of the cairn may not have prevented charcoal from later phases percolating through the overlying rubble.

2.4.2 THE CAIRN OR PLATFORM (ILLUS 21 & 22)

The cairn enveloped that deposit of charcoal and cremated bone and overlapped its edges. It had a substantial outer kerb, part of which had been identified by field survey, but no inner kerb was necessary as it abutted the summit of the hill. Thus it resembled a ring cairn in being open at the centre but is better described by Frances Lynch's term 'platform cairn' (1993, 113). It was about 15m in diameter and, strictly speaking, it was polygonal rather than circular, with as many as eight distinct sections of kerb (illus 22). Although the presence of wedge holes suggested that people had intended to break up the stones, there was nothing to show that any material had been removed. Apart from the damage caused by vegetation, which may have affected the looser material in the centre, the original surface of the monument was intact.

Its outer kerb was composed of blocks and slabs of granite, but these may have been employed in different ways. Where the structure still survived, the less regular slabs were used on sloping ground and the blocks where the natural surface was level. The latter were large enough to retain the mass of the cairn. The slabs, however, were pinned in place between that material and an external bank of rubble; the individual stones did not have any sockets. The bank that had been piled up outside them was more apparent on the flanks of the hill and virtually disappeared where the ground was flat. Where kerbstones were missing or where they had fallen outwards, their position was marked by a shallow trench. This was not a foundation trench, as many of the stones had simply been wedged in position in between two masses of rubble (illus 23 and 24). Loose soil had filled the void that resulted when those kerbstones fell or were lifted from the ground. As a shorthand term, this feature will be referred to as the 'robber trench'.

Structural problems seem to have arisen because the platform extended so far down the slope on the west side of the site (illus 19–22). Here it seems as if the builders had to make careful provision for the material of the cairn to be supported. It is possible



22 Evidence for the kerb at Tomnaverie.

that a certain amount of turf or topsoil had been introduced to provide a better foundation. In addition, both sections through the external deposit of rubble on the southern perimeter of the monument found that the surface of the hill had been cut into a series of steps; a similar feature was observed in an early excavation at Castle Fraser

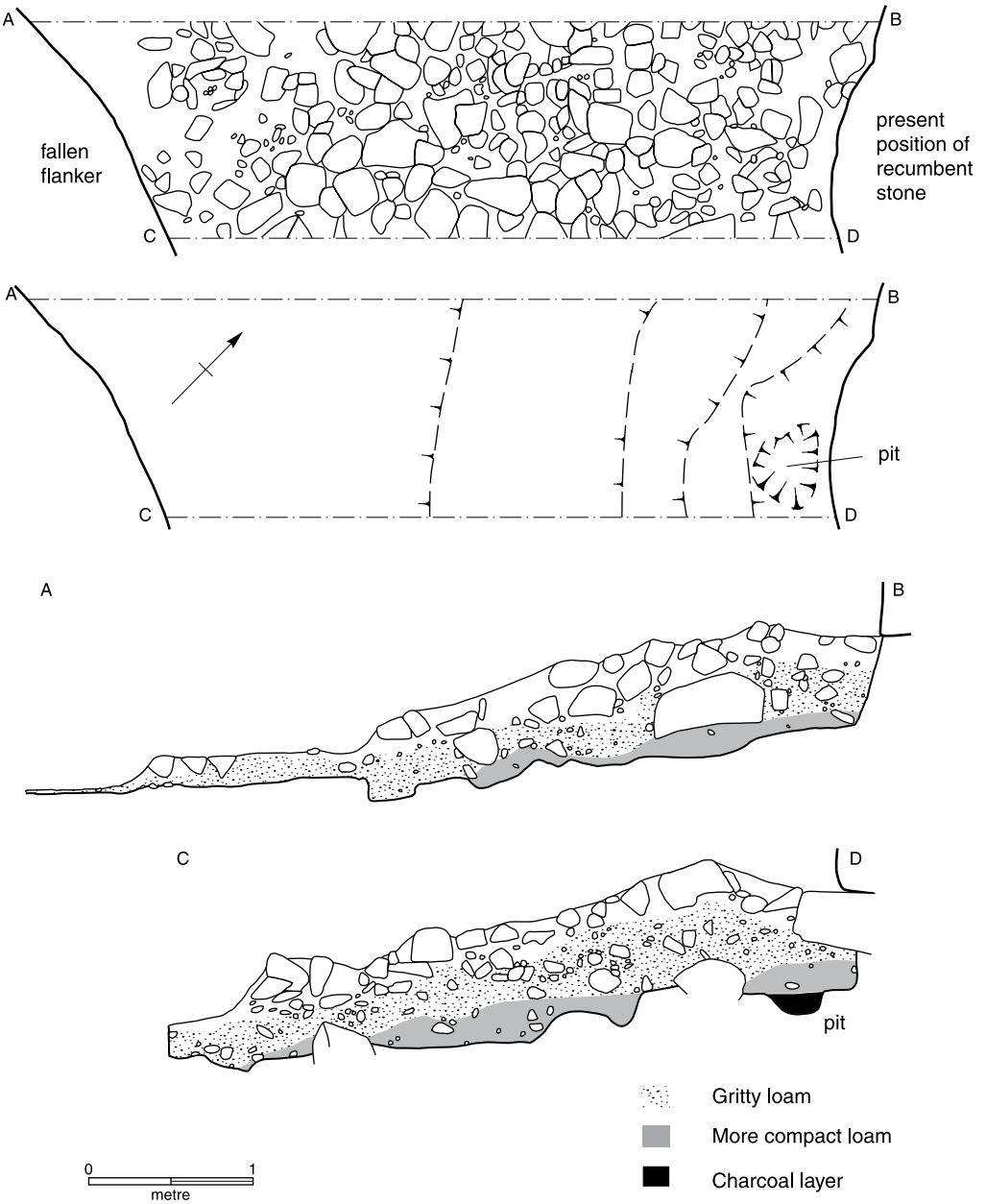
23 Packing for the displaced kerb at Tomnaverie, showing how it had been wedged in position in between two masses of rubble.

(illus 19, 20 and 25; Coles 1904, 299–303). In Trench 7, it is clear that the outer kerb of the monument had been held in place against the side of one of these ledges (illus 19 and 20). The soil layers were bounded by banks of rubble which would have had the effect of retaining walls (illus 25). On the bottom of one of these steps, directly

24 The robber trench for the kerb at Tomnaverie viewed from the exterior.

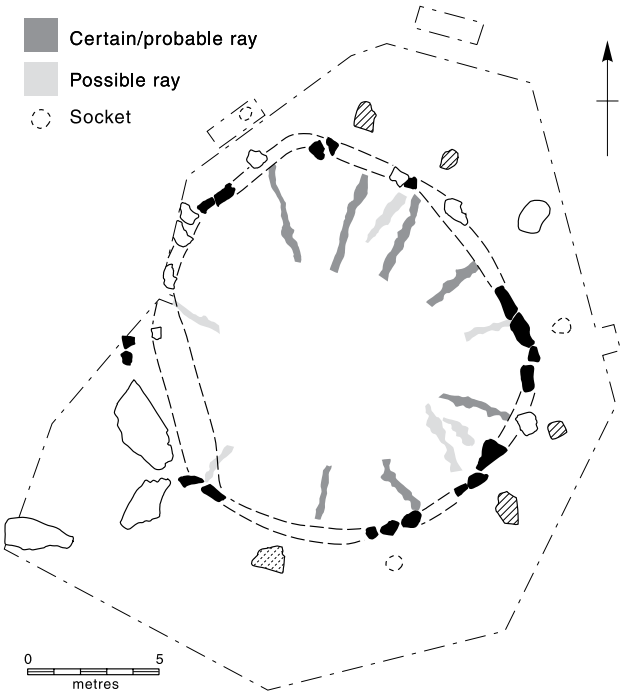
beneath the original position of the recumbent, a shallow pit had been dug into the natural bedrock and filled with charcoal (illus 26). This had clearly been excavated from the surface of that ledge, where more charcoal was found, and for that reason it cannot be an older feature truncated by the building of the monument. Samples from this context produced radiocarbon dates in the mid to late third millennium BC. Details of the individual determinations are given in Table 8. Professor Sturt Manning advises that five of the six determinations can be considered together; the sixth is inconsistent with the others. Since all five dates should refer to the same event, they can be combined as 3959 ± 23 BP. 'A date of *c* 2494–2457 BC is the most likely dating area within the three possible ranges at one standard deviation, or 2498–2432 BC within the four possible ranges at two standard deviations. The 25th century BC represents the most likely working hypothesis' (Sturt Manning, pers comm).

25 One of the banks of rubble in the base of the cairn in Trench 7 at Tomnaverie. *(Image courtesy of the Jim Henderson Collection, Aberdeenshire Council Museums Service)*



26 The stratigraphic sequence in Trench 3 at Tomnaverie. The upper plan shows the surface deposits revealed after initial stripping. The trench extends between the positions of a displaced flanker and the recumbent stone which had been rolled back into the interior of the monument; it would originally have been located on the surface of the rubble platform. The lower plan shows the features cut into the natural bedrock.

There was no evidence of similar procedures in other parts of the site and this has important implications. It seems to have been vital that the surface of the platform should be roughly level and that it should extend over the southern and western limits of the ridge. It was a massive construction and seems to have been designed to bear a considerable weight. These developments do not seem to have happened by chance, for by moving the structure slightly further to the north, the builders would have avoided some of these problems. Its siting ensured that on three sides no dead ground could be seen beyond the monument.



27 The evidence of radial divisions in the cairn at Tomnaverie.

How was its construction organised? To judge from the deposits exposed in the quarry face, some of the raw material used in this structure could have been obtained in the vicinity. Many of the kerbstones were quarried, whilst the cairn was built from rounded boulders which might have been found on the lower ground. That was also true of the material of the outer ramp. One clue is provided by the distinctive deposits around Monolith 3, for here particular use was made of flat slabs. It was difficult to explain this until we observed a natural fault exposed in the quarry face a few metres away. This contained exactly the same material. Colour may have been important, too. The stones comprising the platform, the kerb and the external buttress were redder than those exposed by excavation on the natural surface around the monument. They may have been selected for inclusion in this structure. That was also true of a few quartz blocks which were placed in the edge of the ramp on the southern flank of the monument. Smaller pieces were scattered across the full extent of the site.

Parts of the kerb had been damaged, but four sections can be recognised. Those on the east and west are marked by larger kerbstones, whilst those used in the northern and southern lengths were less substantial. It seemed as if the axis of the monument ran from north-east to south-west and that its limits had been marked by larger kerbstones than the others. Despite these differences of mass, the entire kerb had been graded by height. The large blocks towards the north east formed the lowest section and those towards the opposite side were taller. This was only apparent when some of the fallen kerbstones had been raised and the effect is so subtle that it may have been more apparent to the builders than to a stranger visiting the monument.

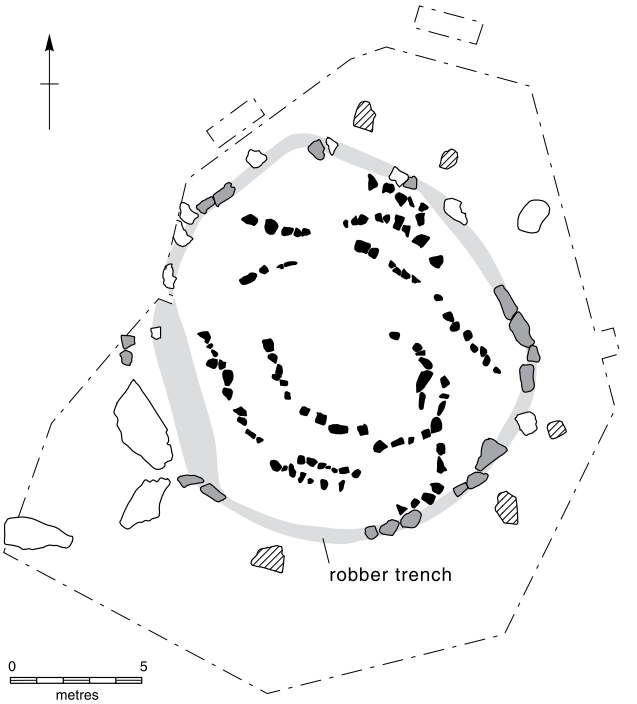
There were also some indications of the internal structure of the platform. Its creation seems to have entailed the movement of earth from other locations on the hill, so that parts of the cairn were really a skin of rubble over a layer of redeposited topsoil. That was apparent in the one section that

28 A radial division in the surface of the cairn at Tomnaverie.

we excavated to the centre of the monument, but in any case it may have been confined to the area where the slope was steeper and where more material would be needed to create a level platform.

The surface of that platform seemed to include radial lines of stones of approximately equal sizes joining the outer kerb to the open area in the centre. These were assigned to two different grades according to the confidence with which they could be identified (illus 27). There were 13 radial divisions, seven of which are regarded as certain or probable and six as possible examples. The more convincing examples were all located in the eastern half of the monument and only two contenders were recognised along its western perimeter. These had been laid out in almost symmetrical groups clustering towards the north-east and may emphasise a north-east/south-west axis. That would have given the monument a 'front' and 'back'.

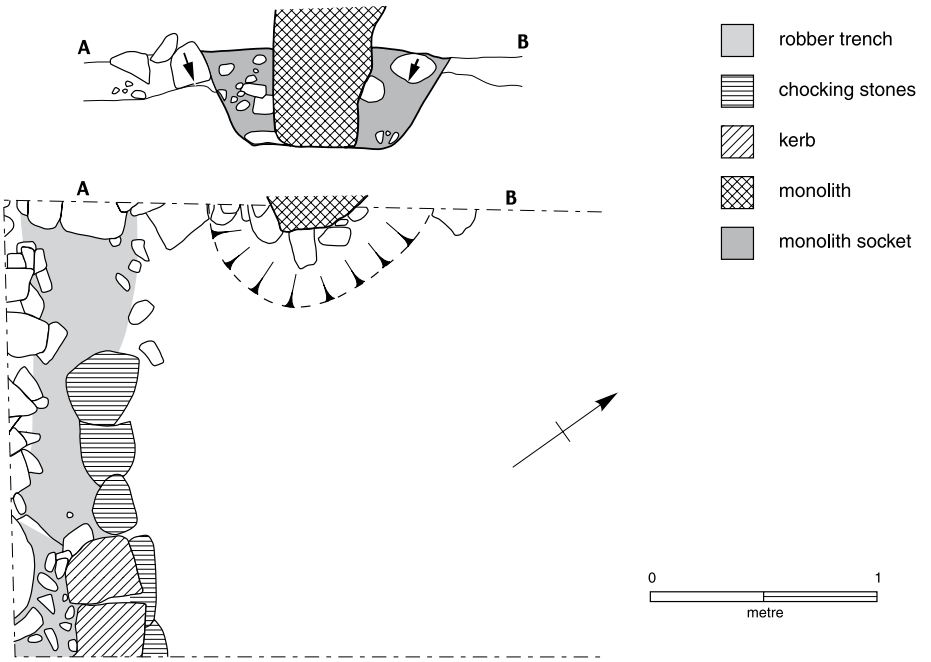
29 Another radial division in the surface of the cairn at Tomnaverie.



30 Arcs of boulders visible in the surface of the cairn at Tomnaverie.

Some of these radial divisions were created by rows of substantial stones and were easy to distinguish in the surface of the platform. In other cases, they looked more like drystone walls (illus 28 and 29). These were left unexcavated to avoid damaging the cairn, but their stratigraphic context became clear where they were exposed in the robber trench left when parts of the outer kerb were removed. Such divisions extended down to the old land surface, so they are a primary feature of the monument. In only four instances were they directed towards changes in the course of the perimeter, but two of them outlined the limits of the long straight stretch of kerb on the south-west edge of the platform.

At first it seemed as if the monument had an inner kerb. Arcs of boulders could be recognised towards the centre of the site, but they never formed a complete circuit and each followed a different course from the others (illus 30). There may be a simple explanation for this. The structure lacked an inner kerb since none was needed. The



31 The position of the kerb and Monolith 11 in Trench 1 at Tomnaverie, showing the position of some of the chocking stone used to manoeuvre the kerbstones into place. The socket for the monolith was dug through the external bank of rubble holding the kerbstones in place.

32 Fallen Monolith 9 at Tomnaverie.

surface of the platform was built flush with the deposits that had already accumulated on the hilltop. The core of the monument had been built outwards from the centre. Substantial boulders had been piled up around the surface of the hill, lapping over the deposit of charcoal and cremated bone which may have formed a low mound. This may once have been covered by a skin of smaller stones but the evidence was so slight that it was more apparent in plan than it was in section; this area had probably been disturbed by the growing trees reported by Coles (1905). Perhaps the appearance of concentric rings was intended by the builders. Like the radial divisions that could be seen in the surface of the platform, they may have been part of the design.

2.4.3 THE EXTERNAL RAMP

This structure extended around the perimeter of the monument, except where it had been truncated by the quarry. Like the kerb, its scale seems to have varied. To the south-west, where the gradient was steepest, it was a considerable feature with a clearly defined outer edge containing a few blocks of quartz, but to the south it was shallower and narrower. Here little of its structure survived.

33 Fallen Monolith 8 and its socket after excavation at Tomnaverie.
(Image courtesy of the Jim Henderson Collection, Aberdeenshire Council Museums Service)

Where it was most substantial, a clear break occurred along the line of the kerb (illus 20) and here the distinction between the boulders on either side of this feature was mirrored by separate deposits of topsoil at a lower level. Clearly this was not conceived as a continuation of the cairn itself, nor did it consist of material that had eroded off that structure: it was an independent entity. That is clear because the steps cut into the natural hillside continued beyond the kerb. In any case the outer edge of the ramp was not concentric with the main part of the cairn.

It seems to have been intended as an external revetment designed to hold the kerbstones in place. That was clearly necessary as some of them were leaning outwards and a number had fallen. They had been wedged in place in between the external deposit of rubble and the main mass of the cairn and were often supported internally and externally by packing stones, one group of which was integral to the material of the cairn whilst the other formed part of the exterior ramp. This is especially evident on the northern side of the monument in Trench 1, for both inside and outside the limits of the cairn there were rounded boulders which may have been used as chocking stones when the kerbstones were manoeuvred into position (illus 31). At the north-eastern limit of the cairn, directly opposite the recumbent stone, sherds of Beaker pottery lay on the old ground surface at the foot of the kerb. They were sealed by the rubble of the external platform and must have been placed there before it was constructed.

This seems to provide additional dating evidence for the monument, but a complication arises with the results of excavation on a similar monument at Cothiemuir Wood (see Chapter 3). Here the external platform supporting the outer kerb of a ring cairn was not constructed in a single operation. Close to the recumbent stone this deposit was laid down at the same time as the kerb, but on the opposite side of the monument (in the equivalent position to the Beaker sherds at Tomnaverie) an interval of unknown duration had intervened. Here the kerb had collapsed and been rebuilt before the platform was added. Again a number of artefacts had been placed at the foot of the kerbstones.

2.4.4 THE RECUMBENT STONE CIRCLE

The stone circle was located in the space between the kerb and the outer edge of the rubble bank. This made it possible to define the stratigraphic

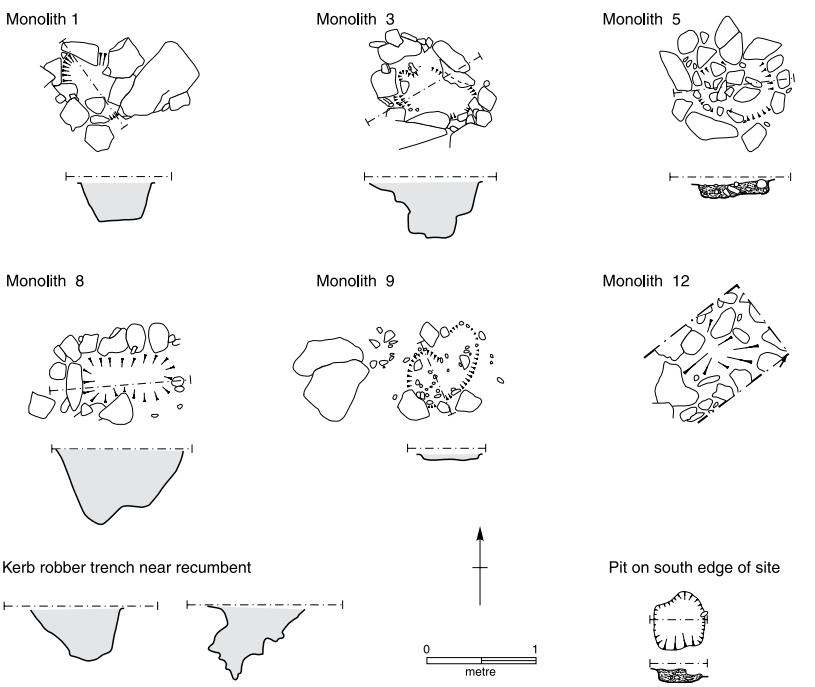
34 Stone-packed socket for Monolith 5 at Tomnaverie.

35 The excavated socket for Monolith 9 at Tomnaverie.

The flankers had quite deep sockets, but the others were relatively shallow, with flat or rounded bases. They contained rings of boulders which had acted as packing stones, and none had been excavated into the bedrock (illus 31–5). The socket for Monolith 9 was even shallower but had a flat bottom which fitted the contours of the fallen stone (illus 35). In this case the upright was hardly set into the ground and may have been secured by a cairn which no longer survives. The shallower sockets were on the northern or western sides of the monument where the external bank of rubble was least substantial, and that may suggest one reason why some of the stones had fallen.

Monoliths 4 and 11 remained in position. In each case the upright stone fitted tightly into a socket that had been dug down to the natural bedrock (illus 20 and 31). These features were recorded in box section and it soon became apparent that they had been excavated from the surface of the rubble. It follows that they were secondary to the platform and the external ramp. In Trench 7 the socket for Monolith 4 was cut through the filling of one of the terraces supporting the mass of the cairn (illus 20). Its characteristic profile suggested that the stone

relationship between the different parts of the monument. The positions of eleven monoliths, including the two flankers, fell within the excavated area (illus 21); a possible example, now lying flat, extended beneath the perimeter fence on the edge of the quarry (Monolith 13). This was not excavated for safety reasons but is shown as a standing stone in a drawing of the monument by Fred Coles (1905). Four stones remained *in situ*, and four or five others had fallen or been moved; Monolith 8 was not known before the excavation. In six instances their sockets were identified. One of these almost certainly belonged to a further upright (Monolith 5) which was found on the quarry floor. Another example, marked by a low cairn of packing material, was recognised on the edge of the excavated area and was not investigated further. This was probably the site of Monolith 12.



36 Profiles of the excavated sockets at Tomnaverie. The drawing also includes two profiles of the kerb robber trench immediately behind the recumbent stone and the section of the isolated pit on the southern edge of the excavated area.

37 The displaced recumbent stone at Tomnaverie. It would originally have been located in the position marked by the ranging pole.

had been manoeuvred into place from the interior of the monument.

The two flankers seem to have been pulled vertically out of the ground during the operation of the quarry. Their sockets were substantially undamaged and large packing stones still remained in position in their edges; these were left in place. Again neither socket cut into the natural bedrock. In both cases the profiles of these features matched the contours of the upright stones, each of which tapered towards the base, probably as a result of deliberate modification (Kilbride-Jones 1934, 83–6). Because of this characteristic they could not have stood before the platform was built. This suggests that both the sockets had been dug from the surface of the bank that provided additional support for the kerb (illus 36).

In the case of the recumbent stone the sequence is simpler still (illus 37). This had been rolled on its side by the quarrymen, and it was possible to investigate the area that had originally been underneath it. It was clear that the recumbent had not been set deeply into this deposit. Rather it had occupied a shallow hollow and had been held in place by massive chocking stones. These were firmly embedded in the surface of the platform and it would have been unsafe to investigate them in detail. In every case where stratigraphic evidence survives, the components of the stone circle were secondary to those of the platform.

When the recumbent stone had been replaced in its original position we could investigate the area immediately behind it. This included two rows of larger stones embedded in the surface of the rubble. At first these were interpreted as a temporary seating for the recumbent before it was moved into position. Further investigation suggests another possibility, for these blocks marked the position of a shallow trench extending between two sections of the kerb at the points where they turned to join the flankers. Its filling included large angular fragments of granite and on its base was the stump of a

38 The foundation of the demolished kerb behind the recumbent stone at Tomnaverie viewed from the north-east. The stump of a broken kerbstone is immediately behind the scale.

39 The foundation of the demolished kerb behind the recumbent stone at Tomnaverie viewed from the south-west.

large upright stone of similar character to those in the nearby kerb (illus 38 and 39). The trench was of about the same depth as the feature left behind when parts of that kerb were removed but it had been refilled with rubble where the latter contained a deposit of topsoil. The most likely interpretation is that this trench had originally held a section of kerb facing towards the south-west. It seems to have retained blocks of unusual size. Its limits were marked by two of the radial divisions visible in the surface of the platform. At some point that kerb had been uprooted, leaving the lower part of one stone in place. The others were probably removed by undermining the structure from the interior of the monument. The resulting disturbance was then refilled, quite possibly with broken fragments of the original kerbstones.

These developments may have taken place when the stone circle was built, for at either end of this trench the kerb changed direction to meet the flankers. It seems possible that all these events were connected so that the platform was extended to join the recumbent stone and a section of its kerb was demolished. The hollow that remained was then filled in with rubble. Now these parts of the monument were linked together.

2.4.5 LATER PREHISTORIC DEVELOPMENTS

There is no archaeological evidence for further developments until the later prehistoric period. At this stage the exposed surface in the centre of the platform seems to have been re-used and there are further signs of burning, apparently associated with cremated bone. This is probably reflected by a series of radiocarbon dates centred on 1000 BC. A later intrusive feature in the centre of the circle contained sherds which probably date from the same period. Just outside the external ramp to the south of the monument was a shallow pit with two

40 Lifting one of the displaced flankers at Tomnaverie.

41 One of the displaced flankers at Tomnaverie being moved towards its socket (*Image courtesy of the Jim Henderson Collection, Aberdeenshire Council Museums Service*)

fragments of pottery in a similar fabric, but in this case there was no evidence of burnt bone.

2.4.6 POST-MEDIEVAL DEVELOPMENTS

In the centre of the platform a shallow pit had been dug into the natural surface of the hill and cut through the earlier deposits (illus 18). This was associated with large quantities of charcoal and cremated bone. At the time of excavation it was tentatively dated to the first millennium BC because it contained the sherds mentioned earlier, but the associated charcoal dates from the 16th and 17th centuries AD, suggesting that this is the real age of the pit. Similar dates were obtained from other samples in the centre of the monument. The cremated bones found inside this feature are indistinguishable from the material in the layers through which it had been dug, implying that they were residual. They contain a significant proportion of male bones and had been burnt to a high temperature. That disposes of an alternative interpretation, for it is not consistent with the idea that Tomnaverie had been re-used for executions during the Aberdeenshire witch trials of 1597 (Goodare 2002, 54–5). In thin section the filling of this pit does not seem to be the result of *in situ* burning, but it still seems likely that fires had been lit somewhere nearby. This raises the possibility that the hilltop acted as a beacon. It is known that another part of the hill was used for lighting bonfires to celebrate more recent coronations.

2.5 RESTORATION OF THE MONUMENT (ILLUS 40–4)

At the end of the excavation the fallen kerbstones were reset in their original foundations, but only where their locations were unambiguous. The recumbent stone was returned to its correct position and both the

42 Tomnaverie: moving the recumbent stone back into its original position. (*Image courtesy of the Jim Henderson Collection, Aberdeenshire Council Museums Service*)

43 Tomnaverie: securing the recumbent stone in its original position.

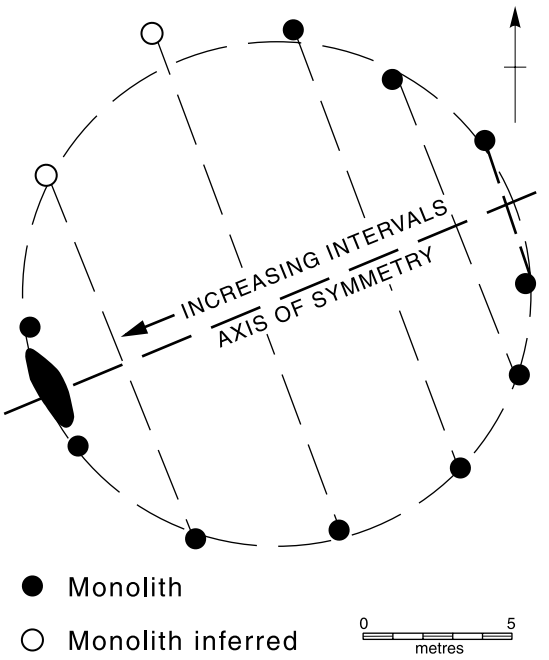
flankers were re-erected in their original sockets. A stone on the quarry floor, long recognised as a component of the monument, was replaced in the nearest socket, which it fitted exactly (Monolith 5). Beside an empty socket identified in the first season of excavation was a fallen stone which had become buried in a patch of silt (Monolith 8). This fitted the socket and is interpreted as another component of the original monument. Its neighbour, Monolith 9, lay flat on the ground, but after it had been moved its socket was identified and excavated. Like the others, this stone has been replaced in its original position. After the excavation, the entire area of the monument was turfed, but a distinct groove, marked by grass of a different kind, was left to indicate the course of the kerb around the outer edge of the platform. At the time of writing new visitor facilities have been created at the site and the refilling of the quarry is well advanced.

2.6 THE FORM OF THE FINAL MONUMENT

Once the fallen stones had been replaced in their original positions it was easier to appreciate the distinctive form of the monument (illus 44). It consisted of a ring of twelve monoliths and a recumbent stone, disposed around the edge of a roughly level platform up to 60cm high. It was located on the end of a ridge and to the south and west had been terraced out across the contours. The monoliths and the flankers followed the circumference of a circle approximately 16m in diameter, but the recumbent was slightly off that alignment. The monoliths were perhaps arranged in pairs with a view to axial symmetry (illus 45). The standing stones were closer together opposite the recumbent and the flankers. They were approximately graded in height from north-east to south-west (illus 46).

All the uprights were pink in colour and seemed to consist of quarried stone, with the exceptions of Monoliths 5 and 11 which were possibly erratics. The recumbent was of glacial origin and is rather whiter than either of the flankers because it contains inclusions of quartz (illus 47 and 48). The flankers themselves came from different sources. The only stones with cup marks were the recumbent and Monolith 5. On the inner face of

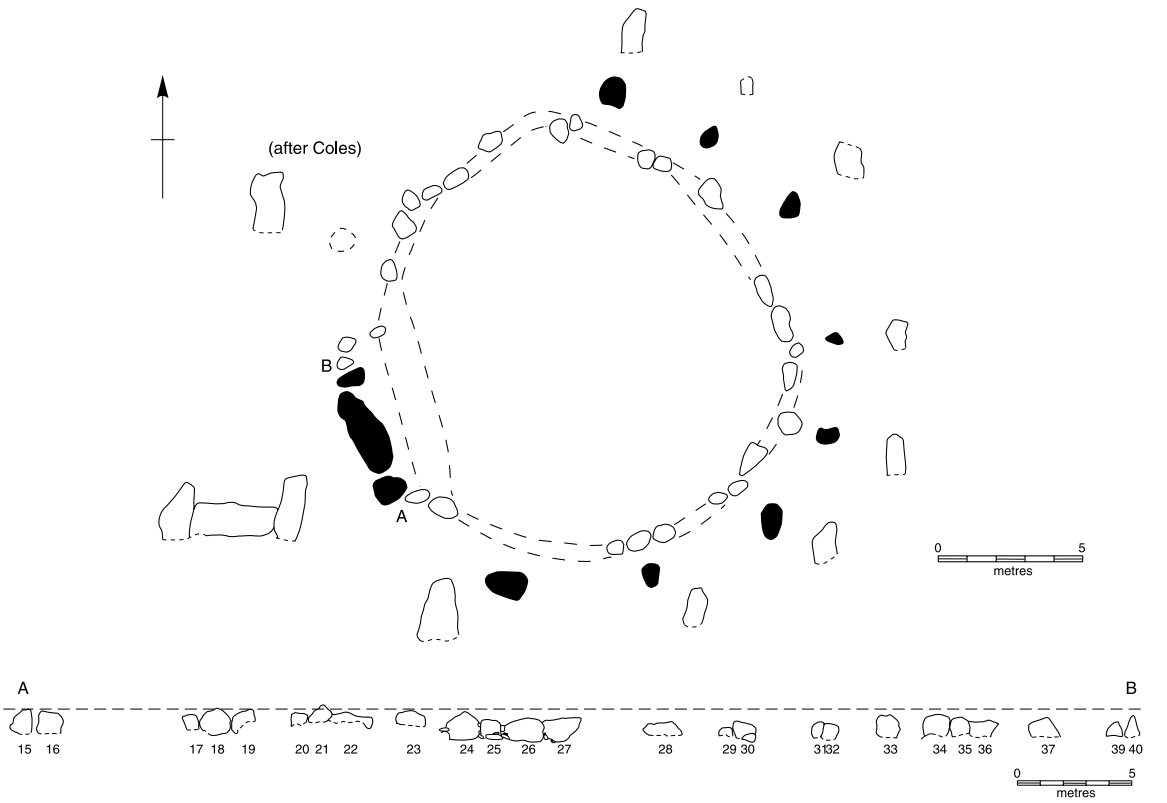
44 The stone circle at Tomnaverie after excavation and restoration of the monument. Morven is on the horizon in the centre of the picture. (*Image courtesy of the Jim Henderson Collection, Aberdeenshire Council Museums Service*)



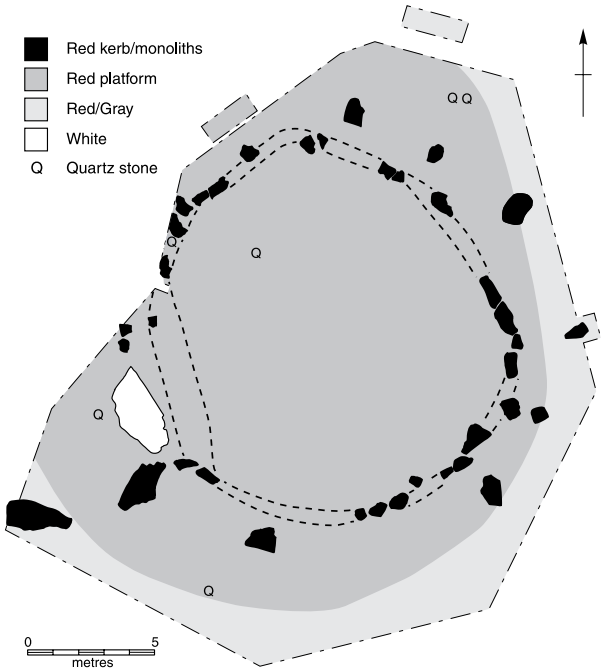
45 A reconstruction of the original layout of Tomnaverie stone circle.

the recumbent stone there is also a wedge-shaped hollow which recalls the form of an Early Bronze Age axehead like those depicted on the cist slab at Nether Largie North (RCAHMS 1988, 68–70). This seems to be of natural origin, but may provide one reason which this particular stone was used in the monument (illus 49).

It is difficult to establish the original form of the kerb which defined the outer limit of the platform. This was probably polygonal, with a long straight section on the south-west side and showed the same grading by height as the ring of monoliths. It was built out of pieces of quarried granite and boulders of similar character to the material used in the circle. Both these groups were red or pink. The largest kerbstones were along the north-eastern perimeter of the monument, but the bedding trench behind the recumbent suggests that this section had been built on a similar scale. Other lengths of kerb consisted of slabs rather than blocks of granite and they would have given these parts of the perimeter a jagged outline. Cup marks



46 Elevation of the restored kerb at Tomnaverie and profiles of the monoliths. For the stone numbers see illus 21. The profile of one of the standing stones, probably the now inaccessible Monolith 13, is based on a sketch by Coles (1905).



47 Stone colours at Tomnaverie. The plan also shows the distribution of unworked quartz in the monument. The two pieces close to the south-western perimeter of the monument were large blocks.

have been identified on the kerb towards the south of the monument. The interior of the platform was predominantly pink or red and was embellished by patterned stonework. Like the composition of the kerb, this made a distinction between the 'front' and 'back' of the monument. It also emphasised the long straight stretch of kerb to the south-west.

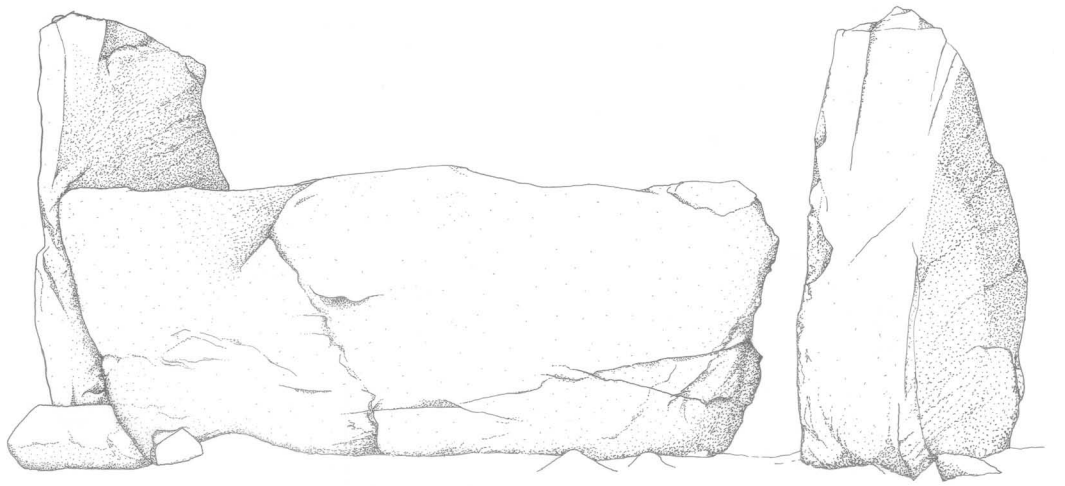
Outside the kerb there was a deposit of rubble which probably played two roles (illus 37). Its main function was to support the outer edge of the platform and to hold the kerbstones in place, but towards the position of the recumbent it also provided a ramp of rounded boulders up which the components of the circle could be drawn. This would have been especially important in the case of the recumbent stone. The edge of this external ramp described an even curve around the perimeter of the site and included a few large blocks of quartz, but there was no indication of a kerb.

No fewer than eight of the radial divisions in the surface of the platform seem to point to the positions where later structures were to be built. Six of them are directed towards monoliths in the stone circle: 6, 7, 9, 10, 11 and 12 (the unexcavated socket on the edge of the quarry). Two more are aligned on where the kerb of the platform would be redirected to join the flankers. That seems more than a coincidence.

There are also links between the kerbstones and the monoliths (illus 50). The clearest instance is towards the recumbent where the stones of the rebuilt kerb seem to have been selected to match the pointed top of one of the flankers (Monolith 3). Further connections link the shapes of individual monoliths to components of the kerb. This applies to Monoliths 5, 6, 7, 8 and possibly 11. The shapes of Monoliths 6, 7 and 8 match those of the nearest kerbstones. The rounded form of Monolith 5 is also mirrored in the stretch of kerb beside this stone. The grading of the uprights reflects that of the existing kerb, but it is notable that most of the other connections are in the area opposite the recumbent.

There may be further links between individual monoliths in the stone circle (illus 50). Monoliths 8 and 9 frame the view of the recumbent and flankers from the north-east. Both these stones have an unusually smooth texture. There could also be a connection between the angular shapes of Monoliths 7 and 10 which are on opposite sides of the circle from one another; Stone 10, however, is broken. In this case the relationship also extends to the nearest kerbstones. These links are confined to the north-eastern sector of the monument and do not seem to extend around the entire perimeter.

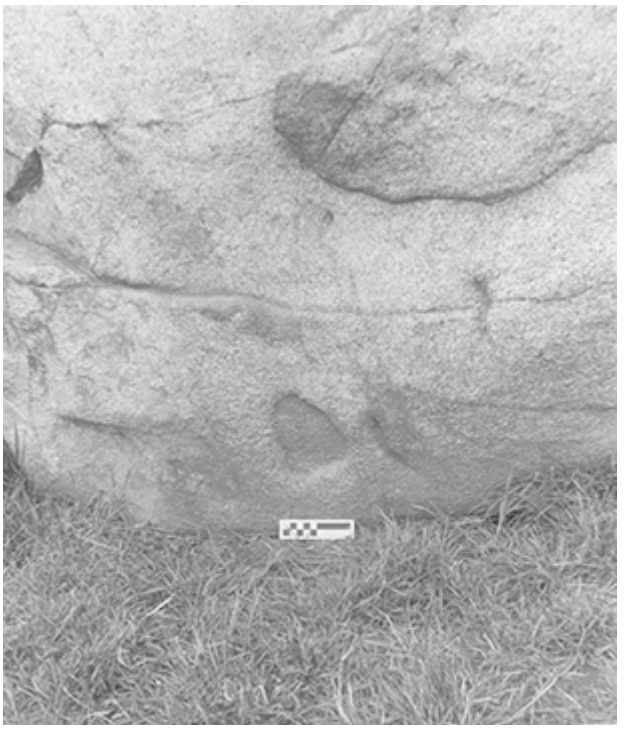
Why did this simple scheme break down? One possibility is that it reflects the sequence of construction, in which the circle was built some time after the kerb. Like other monuments of its type, the stone setting at Tomnaverie adhered to certain conventions concerning the number and spacing of the uprights (Burl 1976b). That did not allow much flexibility. Perhaps the resulting pattern was a compromise between the desire to suggest links between different components of the architecture and the protocols that specified how the stone circle should be organised. There appears to have been a conflict between the desire to match the monoliths to the nearest kerbstones and the wish to form connections between pairs of stones in the circle. Because the cairn was built first, it seems as if the nature of the kerb took precedence over other considerations.



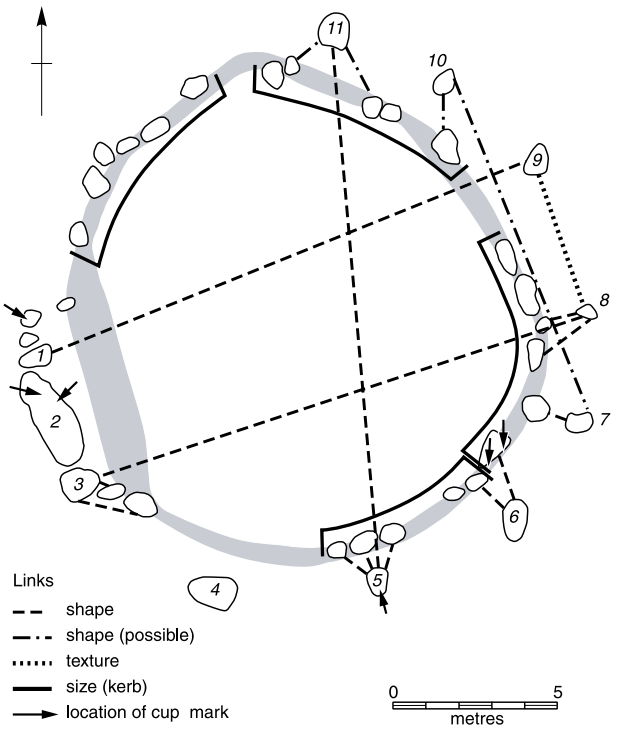
48 Details of the recumbent and flankers after re-erection. 48a shows the outer faces of the stones and 48b depicts their inner faces and shows the position of a cup mark on the recumbent and the position of the natural scar shown in illus 49. (*Drawings: Sharon Arrowsmith*)

At all events, the finished structure was an impressive achievement. Once the stones had been replaced it became clear that the recumbent, like so many others in the region, had been precisely level and was framed by pillars of contrasting height and proportions. One of these (Monolith 1) was taller and flat topped, whilst its counterpart (Monolith 3) tapered to a point (illus 48 and 51). The contrast between the flankers is reflected by the two monoliths on the opposite side of the circle (8 and 9) which frame a view of the recumbent stone. Both have an unusually smooth appearance, and again they can be regarded as a pair. As if to copy the configuration of the flankers, Monolith 9 is noticeably taller than Monolith 8.

That is only apparent from the exterior of the monument. Viewed from the centre of the platform, the recumbent stone obscures the foreground and highlights an intermediate band of hills. Above it there is a cleft in the horizon and beyond that again is the mass of Lochnagar, with two subsidiary peaks on either side. In a way that natural configuration recalls the arrangement of the recumbent and the flankers (illus 51). The connection between them is enhanced because the recumbent stone is whiter than the other parts

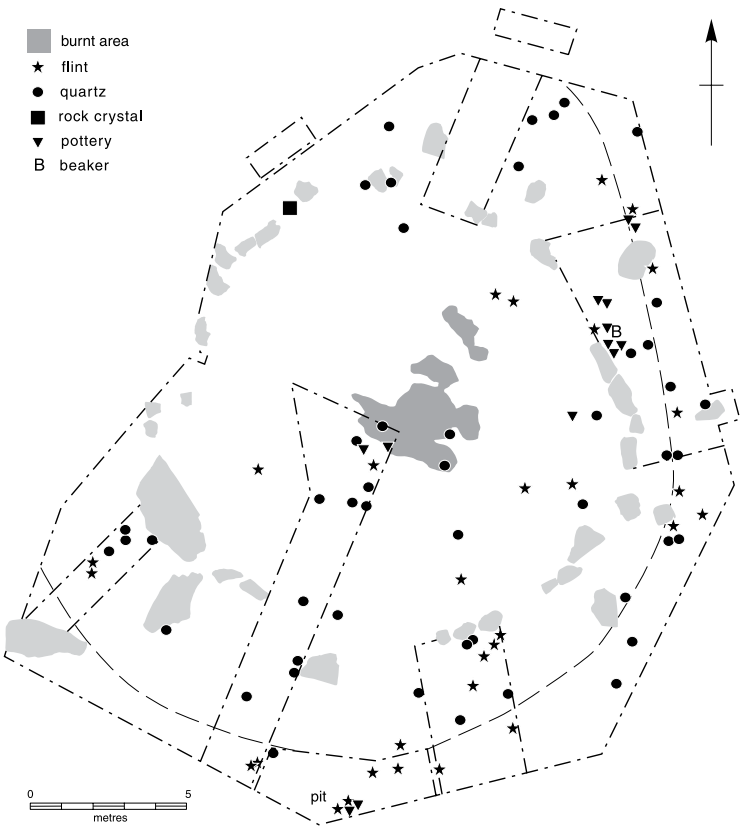


49 A natural scar on the inner face of the recumbent stone at Tomnaverie resembling a carving of a flat axe.



50 Possible links between the monoliths and kerbstones at Tomnaverie.

51 The restored recumbent and flankers at Tomnaverie showing a distant view of Lochnagar.
(Image courtesy of the Jim Henderson Collection, Aberdeenshire Council Museums Service)



52 Distribution of the excavated artefacts at Tomnaverie.

of the circle. Again this may be significant, for Lochnagar retains a covering of snow for longer than the surrounding hills. Between the flankers a section of sky is visible above the recumbent stone. Ruggles has suggested that this corresponds to the position of the setting moon every eighteen and a half years. It is certainly outside the arc within which the sun could be observed from the centre of the circle (1999, Tables 5.1–5.3).

2.7 THE EXCAVATED MATERIAL (ILLUS 52)

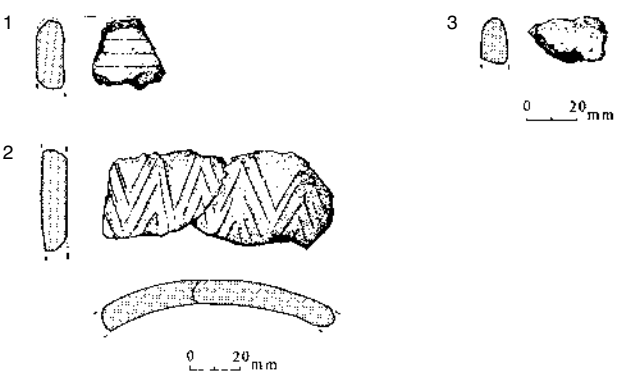
2.7.1 POTTERY (ILLUS 53)

Alison Sheridan

The ceramic finds comprise twelve sherds, two crumbs and a fragment of a daub-like substance. The largest sherd is *c* 54mm by 40mm; and although the small size of most sherds precludes firm identification, it is clear that the assemblage includes both Early Bronze Age Beaker pottery and Late Bronze Age plainware (see below on terminology).

Beaker

At least one, possibly two Beaker pots are represented, by SF nos 365, 369, 393, 420 and 421. All were found close together, on the old land



53 Excavated pottery from Tomnaverie. 1 and 2: Beaker; 3: Later Bronze Age.

surface, near the outside edge of the cairn kerb opposite the recumbent. Despite having slightly abraded edges, sherds 365 and 420 conjoin to form part of the belly of a Beaker, some 170mm in external diameter at this point and with a wall thickness of around 10.5mm (illus 53.1). Most of the outer surface of these sherds is decorated with fairly shallow impressions of a rectangular-toothed comb, arranged as loose nested chevrons running vertically down the body. Sherd 421 appears to be from the rim and upper neck area (although the rim surface is missing), and is probably from the same pot (illus 53.2). Straight-walled, and originally upright or slightly splaying, it is decorated with three shallow incised horizontal lines, and below the lowest is a very faint trace of a diagonal line, too slight to reveal whether it had been comb-impressed. Sherds 369 and 393 are heavily abraded and have lost most of their external surface, but enough survives (on 369, at least) to show that they had been decorated with comb impressions. To judge from wall thickness, fabric and colour, it is not impossible that these, too, come from the same pot but that they have suffered greater degradation. All six sherds are of a medium (ie not particularly fine or coarse) fabric that is slightly gritty; the exterior surface had probably been wet-smoothed to obscure the grits, which are more evident on the interior and where the exterior has been worn away. The inclusions occur in a density of around 15–20% (except on sherd 421, where they are sparser), and are mostly small (< 1.5mm by 1.5mm), angular and sub-angular, and of a crystalline rock containing black and white minerals. Occasional gold-coloured mica platelets are also present and may have come from the same, deliberately crushed, tempering material. Other inclusions range up to 6mm by 4mm in size and include a dull grey, less angular rock whose fragments might have been present naturally in the clay. The colour is shown most clearly in sherd 421, which has a fresh fracture surface: the exterior and interior surfaces are light brown, to a depth of 2–3mm, and the core is black. This indicates a rapid firing.

The combination of straight neck, below-rim horizontal lines and vertical nested comb-impressed chevrons places this Beaker within Clarke's Northern series (particularly N3–N4), although the decorative elements are also found on some Southern Beakers (Clarke 1970). According to Ian Shepherd's scheme for north-east Scotland (and particularly for the Buchan area), it could be allocated to his step 5 or 6 (Shepherd 1986). Although many Beakers of this general type have vertical chevron decoration arranged as discrete motifs of filled triangles interspersed with plain triangles (eg at Afforsk, Banff: Clarke 1970, fig 728), there are examples where the nested chevrons run over most of the surface (eg at Auchrynie, Aberdeenshire: *ibid*, fig 722; the angle of the chevrons is shallower than at Tomnaverie).

Unfortunately, in the light of the British Museum Beaker Dating Programme (Kinnes *et al* 1991), it is not possible to suggest a date range for this type of Beaker narrower than *c* 2300–1700 BC. Furthermore, although the suite of dates obtained from the pre-platform pit attest to initial monument-related activity during the second half of the third millennium BC (AA-49279–84), the exact chronological relationship between this pit and the Beaker find context is unclear.

Late Bronze Age plainware: probable and possible examples

The probable examples are sherd 652 and sherd spall 653 from the same pot from the pit beyond the platform on the south side of the monument, and probable rimsherd 278, from the interior of the monument to the north-east of the recumbent. The possible examples, comprising sherds and crumbs too small to be diagnostic, are 563 and 486, both from the central area, outside and at the edge of the central pit.

Sherds 562–3 are from the body of a fairly large, probably undecorated pot, whose diameter at this point is estimated at *c* 260mm and whose wall thickness is *c* 13mm. The inner surface has been carefully smoothed to a low sheen, with marks of the smoothing tool visible; the exterior, though smoothed, is slightly uneven. The fabric is fairly hard. Inclusions are small (up to 3mm by 2mm), at a density of *c* 7%, and consist of finely-crushed quartz (with some fragments having speckles of a black mineral). The outer half of sherd 652 is reddish-brown, the inner half black, suggesting that the pot had probably been fired in an inverted position. Its ancient fracture surfaces are slightly abraded.

Sherd 278 is likely to be a rimsherd; there is slight damage to its upper edge, but from the

sherd's overall shape it appears that its rounded top is a true rim, rather than a coil joint line (illus 53.3). Although the sherd is too small for a reliable estimate, the rim diameter will have been over 120mm; wall thickness is 10mm. Although both surfaces have been smoothed, the exterior is slightly uneven. The fabric is reasonably hard; inclusions comprise small (up to 2mm by 2mm), angular fragments of the black-and-white speckled stone seen in the Beaker and in 562–3, complete with at least one gold-coloured mica platelet; the density is approximately 3–5%. The fracture edges are slightly abraded, and core colour is obscured but appears to be blackish, with a reddish-brown surface colour.

The small sherd spall 563 (*c* 15mm by 13mm), and the equally small sherd spall 486 (plus crumbs), are really too small and abraded to allow confident identification; all that can be said is that they could be of the same type of pottery as that represented by sherds 562–3 and 278. Inclusions are very small and sparse, but in 563 individual black and white mineral specks are visible.

Despite the small size of all of the aforementioned pieces (the largest of which, 562, is *c* 44mm by 25mm), their appearance is consistent with that of the Late Bronze Age plainware (the so-called 'flat-rimmed ware') found in secondary deposits at other recumbent stone circles, such as Old Keig and Loanhead of Daviot, Aberdeenshire (Childe 1933; 1934; Kilbride-Jones 1935), and they may well have come from bucket-shaped pots. The term 'flat-rimmed ware' has long been agreed to be an inadequate and inaccurate, if handy, descriptor of later prehistoric plainwares spanning over a millennium; and although work has been in progress on examining their chronological and geographical variability (Catherine McGill, current PhD research, Edinburgh University), no significantly better terminology has yet been developed. Those examples which had definitely or possibly contained cremated remains, as at Duff House, Banff (Anon 1857, 298), could be included within the 'bucket urn' category; although here, too, current dating work undertaken for the National Museums of Scotland has revealed that this broad class of pottery was also of long duration (Sheridan 2003). Indeed, the Duff House example has been dated to the 13th century BC by Eogan (1994, 85–7), on the basis of its associated gold jewellery. A date of 2820 ± 50 BP (GrA-21696, 1050–900 cal BC at 1 standard deviation, 1130–830 cal BC at 2 standard deviations has recently been obtained for cremated bone associated with this kind of pottery at Old Keig; this is consistent with three of the dates obtained for the deposit of burnt material in the centre of the platform at Tomnaverie (AA-49291–3) and for Late Bronze Age activity at Aikey Brae. Similar dates have also been obtained for Late Bronze Age activity (including re-use of Early Bronze Age monuments) in and around the Clava cairns at Balnuaran of Clava, Highland (Bradley 2000, 115–121; 129–30).

The similarity in tempering material between this pottery and the Tomnaverie Beaker sherds might indicate that both had been made using locally-available material; investigation of the bedrock and drift deposits would be necessary to verify this.

Other, indeterminate pottery

Two sherds, 464, from close to the inside of the cairn kerb, and 525, from the central pit, are thinner-walled and of finer fabric than the rest of the Tomnaverie pottery. They are both undecorated, medium hard body sherds with smooth inner and outer surfaces and no significant colour difference between core and surfaces (indicating that they have been oxidised throughout during firing). The fracture edges of 464 are slightly abraded. Inclusions are tiny (< 1mm by 1mm) and sparse, but include the same minerals as seen in the other sherds.

These sherds are described as 'indeterminate' because, although the Late Bronze Age pottery at Loanhead of Daviot encompassed a range of textures including some quite fine, nothing quite as fine and thin-walled as this is represented. It may be, of course, that these sherds are indeed of Late Bronze Age date; the repertoire of LBA wares is not well documented. They are certainly not wheel-thrown (thus any possible association with the post-medieval activity at the monument can be ruled out); and although they are comparable in fineness to Early Neolithic pottery, they are too small to be diagnostic, and it is not suggested that they are of this date.

Possible daub

The most intriguing ceramic item from Tomnaverie is 480, from outside the central pit. This fragment

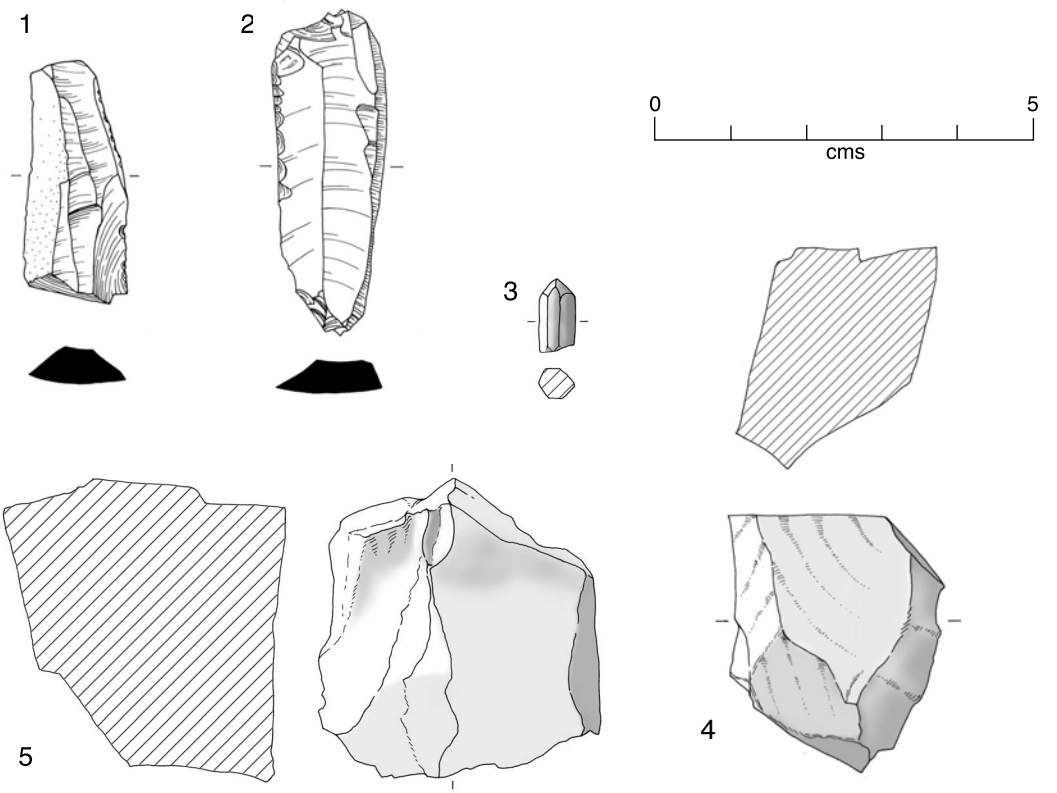
of thoroughly fired/burnt clay is of irregular cylindrical shape, roughly 15mm in diameter and 12.5mm thick. Friable, and of variegated pale grey-orange colour, it contains a couple of tiny fragments of carbonised organic material and a small area of blackish, sandy clay but is otherwise free of inclusions. The outer surface is markedly smooth over part of its circumference, and the 'lower' surface is fairly smooth if uneven.

Although not a classic example, this resembles daub in its colour and appearance. Its shape and size suggests that clay has been pressed into the hollow interior of a withy (or indeed vice versa: that a withy had been pressed down into a fine clay surface), and subsequently burnt. Normally daub preserves impressions of the exterior of withies, and indeed withies are normally not hollow, when fresh; but it is nevertheless not inconceivable that some daub/clay could enter the end of an individual withy. Two possible interpretations suggest themselves: the first that this is from a wattle-and-daub structure constructed at the monument; the second that some wattle-and-daub structure or artefact (eg bier) had been involved in the putative cremation ceremony, the remains of which were deposited in the centre of the monument. (A variant on this idea is that of a simple wattlework structure, such as a screen, set into a clay surface and subsequently burnt.) Of these suggestions, the first is not very persuasive, for if such a structure had existed, one would have expected more than one small fragment of daub to have survived. The second is possible, but no example of any such artefact/construction is known from a Bronze Age context. For now, the fragment must remain a mystery.

2.7.2 WORKED STONE (ILLUS 54)

Tim Phillips

In total 88 pieces of worked stone were recovered, one of the struck quartz chunks coming from the surface just outside the excavated area. One piece of natural crystal was also found. This is discussed



54 Lithic artefacts from Tomnaverie1: retouched flint blade; 2: retouched flint blade; 3: piece of natural crystal; 4: quartz core; 5: quartz core.

with the worked stone because of the deliberate deposition of similar material at Cothiemuir Wood. The assemblage is detailed in Table1.

Raw material

The two main types of raw material present were flint and quartz, although one piece of worked rock crystal and a struck quartzite flake were also recovered (Table 1). Most of the quartz was inner material. Of the secondary worked pieces where the cortex could be recognised about half and been derived from pebble sources, and the rest from outcrops. The fieldwalking survey observed readily available pebble and outcrop quartz in the area around the site. This material was most likely derived from local sources.

On the primary and secondary pieces of flint all the recognisable cortex came from beach pebbles; there did not appear to be any pieces of mined Boddam flint (Saville 1993). This is similar to the material recovered by fieldwalking. The source of the flint was most likely on the east coast.

One small and broken fragment of natural crystal was found (illus 54, no 3). This was recovered whilst cleaning the surface of the cairn. Although its context is not secure, it is possible that it was a prehistoric deposit. This type of material was not found locally and must have been introduced.

Technology

None of the quartz showed signs of further modification. Most of the pieces were either simple struck flakes or chunks from which one or two flakes had been removed, although three rudimentary cores were recovered (illus 54, nos 4 and 5). This would suggest the expedient use of a readily available raw material. However, most of the quartz assemblage consisted of inner pieces. This may indicate the intensive use of quartz or, alternatively, the final reduction of material taking place at the site. The latter is also suggested by the presence of a relatively high number of struck chunks, three cores and a couple of quartz chips which can be recognised as knapping debris.

The flint assemblage was composed of relatively small pieces. 12 of the 39 artefacts were small chips. This is consistent with the use of a raw material at a distance from the source. Most of the assemblage was composed of knapping debris, although two fine retouched blades were recovered (illus 54, nos 1 and 2). One of these was a primary struck piece. Four other blades and one possible broken blade were found. The flaking techniques, types and colours of the Tomnaverie material are very similar to those found by fieldwalking in the Howe of Cromar.

Artefact types

The only retouched artefacts were two flint blades found outside the kerb close to Monolith 8.

Stratigraphy (illus 52)

Worked stone was found in almost all parts of the site. There were only a few areas where it was rare or absent. There was a low density of material

Table 1 Summary of the lithic artefacts from Tomnaverie.

	Primary	**Secondary**	**Inner**	**Total**
Quartz flakes	–	4	23	27
Quartz chunks	–	5	12	17
Quartz chips	–	–	2	2
Rock crystal flake	–	–	1	1
Quartzite flake	–	–	1	1
Flint flakes	–	9	7	16
Flint blades / PBT*	1	1	3	5
Flint chunks	–	2	4	6
Flint chips	–	–	12	12
Natural crystal	–	–	–	1
Total	1	21	65	88

* Pieces possibly worked by blade technology

towards the south-west around the area of the recumbent stone. In the centre of the cairn most of the material was recovered in the excavation of the central pit and the disturbed area around it, but very little was found during surface cleaning. The general spread of material was in an arc around the central area, with a concentration towards the north-east side of the monument. This decreases towards the south and south-west and also appears to do so to the north and north-west, but much of that edge of the site had been removed by quarrying.

In the excavated areas, two pieces of flint came from a small pit on the southern edge of the platform and were associated with sherds of late prehistoric pottery. In the trench on the north-east side the two retouched blades were found close to the fallen Monolith 8 and another blade near to Monolith 9. One of the quartz cores came from the area where Beaker pottery was concentrated opposite the recumbent stone. Another quartz core came from the platform on the north side of the monument, and a third from the edge of the central pit. The small fragment of natural crystal was found on the platform to the south. This is not an especially conspicuous location and for that reason it need not be a modern 'visitor offering'.

Discussion

Three concentrations can be recognised in the distribution of worked stone. A group of artefacts in the centre of the monument may have been related to a range of activities, including the cremation of the dead. Further to the east and north-east, lithic artefacts were deposited in an arc around the limits of the cairn. There was a concentration of material in the excavated area just outside the kerb and opposite the recumbent stone. This included the fine retouched flint blades and the only sherds of Beaker pottery. The density of material decreased towards the southern and, perhaps, the northern sides of the site.

2.7.3 THE CREMATED HUMAN SKELETAL REMAINS

Angela Boyle

Introduction and quantification

Each find of a fragment, or group of fragments, of cremated bone was recorded separately in the field. These amounted to 95 separate groups. These are summarised in Table 2. At the time of excavation it seemed as if all the cremated bone belonged in two discrete deposits: the site of a pyre associated with the primary use of the monument, and a pit containing sherds of later prehistoric pottery which had been cut through it. Radiocarbon dates confirm that there was a period of use in the Late Bronze Age but show that the pit was dug in the 16th or 17th century AD. It now seems that the human remains found in that pit were reworked from the deposits into which it was cut and for that reason all the skeletal remains can be regarded as a single deposit, although there is no indication of the length of time over which it accumulated.

Condition of the bone

Most of the cremated bone was in good condition. However, fragments from two contexts were weathered or abraded (479 and 583); one came from the central deposit and the other from the disturbed surface of the cairn.

Age and sex

It was possible to assign broad age categories to 28 of the deposits: these were subadult, adolescent, young adult and adult. Bones within four deposits were tentatively identified as male (469, 560, 585 and 605).

Weight

The majority of the deposits weighed 1g or less, and in this respect they contrast with the cremations from Loanhead of Daviot (Kilbride-Jones 1935, 214). Weights are summarised in Table 3. The expected weight for a cremation is derived from known weights of adult cremated remains from modern crematoria (using the >2 mm fraction to render them comparable with most archaeological cremated material). They have been found to range between 1001.5g and 2422.5g, with an average of 1625.9g (McKinley 1993). From a sample of about 4000 multi-period burials a range of 57–2200g was obtained from undisturbed adult burials (McKinley 1997). The reason for this variation is uncertain, but it is clear that widely different quantities of bone were included in burials at the time of deposition. Clearly, none of the deposits at Tomnaverie represents the complete remains of a single individual.

Table 2 Summary of all deposits of cremated bone at Tomnaverie.

Small find no.	Weight	Age	Sex	Colour	Identifiable fragments	Comments
13						unburnt animal or hare
54	1g	?	?	white and well calcined	long bone shaft	
55	1g	?	?	white and well calcined	nothing identifiable	
73	> 1g			white and well calcined	nothing identifiable	
86	> 1g			white and well calcined		possible animal, very smooth cortex
167	1g			white and well calcined	long bone fragments	
179	1g			white and well calcined	long bone shaft	
181	> 1g	?	?	white and well calcined	skull vault	
184	1g	?	?	white and well calcined	nothing identifiable	
185	> 1g			unburnt	possible animal	
358	> 1g	adult	?	white and well calcined	mandible	
360	1g	adult	?	white and well calcined	skull vault	
372	1g	?	?	white and well calcined	nothing identifiable	
373	7g	?	?	white and well calcined	skull vault, long bone shaft	
375	1g	?	?	white and well calcined	long bone shaft	
388	8g	adult	?	white and well calcined	left petrous, long bone shaft	
389	1g	?	?	white and well calcined	nothing identifiable	
398	1g	?	?	white and well calcined	nothing identifiable	
416	3g	?	?	white and well calcined	skull possibly zygomatic	
417	> 1g	?	?	white and well calcined	nothing identifiable	
467	1g	?	?	white and well calcined	skull vault	
469	4g	adult	M?	white and well calcined	quite thick frontal bone	
470	1g	?	?	white and well calcined	nothing identifiable	
472	17g	adult?	?	white and well calcined	long bone fragments	
475	> 1g	?	?	white and well calcined	nothing identifiable	
476	> 1g	?	?	white and well calcined	long bone shaft	
479	> 1g	?	?	white and well calcined	skull vault	fragments are abraded a single fragment is probable animal
494	7g	adult?	?	white and well calcined	long bone fragments	
495	> 1g	adult	?	white and well calcined	skull vault	
496	2g	?	?	white and well calcined	skull vault	
497	> 1g	?	?	white and well calcined	long bone shaft	
498	2g	adult	?	white and well calcined	skull vault	
499	> 1g	?	?	white and well calcined	long bone shaft	
500	1g	?	?	white and well calcined	nothing identifiable	
504	11g	?	?	white and well calcined	nothing identifiable	
506	3g	?	?	white and well calcined	nothing identifiable	
507	> 1g	?	?	white and well calcined	nothing identifiable	
508	6g	adult	?	white and well calcined	skull vault, long bone	
510	> 1g	?	?	white and well calcined	long bone shaft	
512	1g	?	?	white and well calcined	nothing identifiable	
513	1g	adult	?	white and well calcined	skull vault	
515	11g	adult?	?	white and well calcined	long bone shaft	
516	> 1g	?	?	white and well calcined	nothing identifiable	
517	> 1g	?	?	white and well calcined	skull vault	
523	4g	?	?	white and well calcined	skull vault	
524	69g	adult	?	white and well calcined	skull vault, cervical vertebra, femur, tibia	
529	> 1g	?	?	white and well calcined	skull vault, long bone shaft	
530	3g	?	?	white and well calcined	skull vault, long bone shaft	
532	> 1g	?	?	white and well calcined	skull vault	
533	3g	adult?		white and well calcined	skull vault	
534	6g	?	?	white and well calcined	skull vault, long bone shaft	
535	> 1g	?	?	white and well calcined	skull vault	

Small find no.	Weight	Age	Sex	Colour	Identifiable fragments	Comments
537	2g	adult? subadult?	? –	white and well calcined	skull vault and long bone skull vault	
540	3g	?	?	white and well calcined	nothing identifiable	
541	> 1g	?	?	white and well calcined	nothing identifiable	
542	2g	?	?	white and well calcined	?tibia	
544	5g	?	?	white and well calcined	skull vault, long bone shaft	
552	> 1g	?	?	white and well calcined	long bone shaft	
553	6g	?	?	white and well calcined	skull vault, long bone	
554	3g	?	?	white and well calcined	long bone shaft	
556	4g	?	?	white and well calcined	long bone	
557	8g	adult	?	white and well calcined	skull vault and long bone	
558	3g	?	?	white and well calcined	skull vault	
559	4g	?	?	white and well calcined	tooth root fragment, long bone shaft	
560	9g	adult	M?	white and well calcined	skull vault, long bone	very thick vault
561	1g	?	?	white and well calcined	nothing identifiable	
562	2g	?	?	white and well calcined	skull vault, long bones shaft	
567	1g	?	?	white and well calcined	nothing identifiable	
568	1g	?	?	white and well calcined	nothing identifiable	
569	2g	young adult	?	white and well calcined	skull vault	sutures quite open
570	3g	?	?	white and well calcined	nothing identifiable	
571	1g	?	?	white and well calcined	nothing identifiable	
572	3g	?	?	white and well calcined	skull vault, long bone	
573	2g	?	?	white and well calcined	long bone shaft	
574	1g	?	?	white and well calcined	skull vault	
575	17g	?	?	white and well calcined	skull vault, long bone shaft	
579	1g	?	?	white and well calcined	nothing identifiable	
581	17g	?	?	white and well calcined	humerus and tibia	
583	249g	adult	?	white and well calcined	skull vault, axial, upper and lower limbs	a single fragment of long bone has a weathered appearance
585	20g	adult	M	white and well calcined	occipital, long bone shaft	
591	> 1g	?	?	white and well calcined	nothing identifiable	
592	3g	?	?	white and well calcined	skull vault	
594	400g	adult	?	white and well calcined	skull, axial, miscellaneous long bone	
595	131g	adult	?	white and well calcined	skull vault, mandible, axial, upper limb	
598	121g	adult	?	white and well calcined	skull vault, petrous fragment, probable canine, rib, metapodial shaft, femur, tibia	
599	13g	adult	?	white and well calcined	skull vault, long bone	
604 II	14g	adult	?	white and well calcined	skull vault, long bone shaft	
605	326g	adult	M??	white and well calcined	skull vault, mandible, axial, upper limb	moderate suture closure
607	3g	adult?	?	white and well calcined	maxilla	
611	1g	?	?	white and well calcined	skull vault, tibia shaft	
614	9g	?	?	white and well calcined	skull vault, long bone shaft	
615	10g	adolescent		white and well calcined	skull vault, lumbar vertebrae, long bone shaft, distal epiphysis of fibular	
619	> 1g	?	?	white and well calcined	long bone shaft	
Trench 7, sample EE	9g	adult?	?	white and well calcined	skull vault, long bone shaft	
Trench 7, sample FF	3g	?	?	white and well calcined	long bone shaft	
Trench 7, sample II	1g	?	?	white and well calcined	skull vault, long bone shaft	

McKinley noted (ibid, 142) that primary burials in Bronze Age barrows produced high weights of bone (902.3g to 2747 with an average of 1525.7g) while the average weights of bone from cremation cemeteries were much lower (327g to 466g). At Barrow Hills, Oxfordshire, deposits other than the central ones were on the whole very much smaller. This may suggest deliberate selection and burial of a token deposit (Boyle 1999, 176). Other possible causes of loss need to be considered and these include incomplete recovery, disintegration and truncation due to ploughing.

Multiple burials

The number of individuals within a deposit is demonstrated either by obvious age-related differences in bone size and development as one would see between an immature and adult individual, or by duplication of identifiable bone fragments (McKinley 1997, 130). Multiple burials most commonly include a subadult or adult of either sex, with an immature individual (*ibid*, 142). A single deposit appeared to contain the remains of more than one individual. The deposit weighed only 2g but incorporated both adult and subadult skull vault.

Burnt animal bone

Possible burnt animal fragments were recognised in deposits 86 and 494, but the species cannot be identified. From a total of about 130 British Bronze Age burials an average of 16% contained cremated animal bone (*ibid*, 132). The quantities recovered were generally small, including parts of one or two species, most commonly immature sheep/goat or pig and bird. With both artefacts and animal bones it should be remembered that since not all the human bone was collected for burial it is probable that neither were all of the pyre goods. Hence those noted should be regarded as a minimum.

Temperature

Bone colour may be used as an approximate guide to firing temperature. Uniformity of colouration denotes even firing, with no evidence for variation in firing temperature or duration across different parts of the body. In all deposits the fragments were neutral white in colour. Shipman *et al* (1984) demonstrated that colour can be used as a very approximate guide to firing temperature. The appearance of the fragments suggests temperatures in excess of 645°C, and probably in excess of 940°C (Table 5).

Table 3 Weight categories of all cremation deposits at Tomnaverie.

Weight range	**Cremation Nos**	**Total**
1g or less	54, 55, 73, 86, 167, 179, 181, 184, 185, 358, 360, 372, 375, 389, 398, 417, 467, 470, 475, 476, 479, 495, 497, 499, 500, 507, 510, 512, 513, 516, 517, 529, 532, 535, 541, 552, 561, 567, 568, 571, 574, 579, 591, 611, 619, Tr 7 SII	46
< 1–50g	373, 388, 416, 469, 472, 494, 496, 498, 504, 506, 508, 515, 523, 530, 533, 534, 537, 540, 542, 544, 553, 554, 556, 557, 558, 559, 560, 562, 569, 570, 572, 573, 575, 581, 585, 592, 599, 604II, 614, 615, Tr7 SEE, Tr 7 SFF	43
51–100g	524	1
101–150g	595, 598	2
201–250g	583	1
301–350g	605	1
351–400g	594	1
Total		95

Conclusion

It would seem most likely that the deposit containing cremated human remains is the detritus of a pyre site, particularly given the evidence for *in situ* burning. Presumably individuals were cremated here and their remains removed for reburial elsewhere.

2.7.4 SOIL MICROMORPHOLOGY

Stephen Lancaster, Donald Davidson and Ian Simpson

In seeking to establish the structural sequence at Tomnaverie, excavation also identified well-sealed fossil soils (palaeosols) and associated land surfaces beneath the monument. In this study thin section micromorphology is used to describe and interpret the features of these fossil soils. As soil properties reflect the cultural and natural environments in which they have been formed, it is anticipated that this will provide evidence of local environments prior to and during monument construction, and of post-construction processes that may have affected these soils. Furthermore, analyses and interpretation of soils from beneath this monument and one at Cothiemuir Wood (reported in Chapter 3) permits comparisons to be made with fossil soils found beneath another distinctive class of Late Neolithic/Early Bronze Age monument in northern Scotland, the Clava Cairns, where micromorphological analyses have also been undertaken. This allows contrasts to be made between the fossil land surfaces beneath these two different classes of monument. An account of Tomnaverie is given here, and in Chapter 3, 3.6.2, the results of this work are compared with those at Cothiemuir Wood and other sites.

The Tomnaverie stone circle is situated on the crest of a hill on freely draining iron podzols of the Countesswell series, formed in till derived from granite and granitic gneiss (Soil Survey for Scotland 1957). The monument has three structural elements: a central cairn with a possible cremation pyre, a circle of monoliths and an outer platform of rubble. An excavated trench (Trench 7) extending from the centre of the cairn through the stone circle to the outer platform permitted field description (Munsell colour and texture) and sampling of the soils beneath the site. Five undisturbed soil samples were collected in Kubiena tins (80mm by 50mm by 40mm) from the trench: three beneath the outer platform area (two east and one west of the central cairn), one beneath the main core of the cairn and one from the central area.

Table 4 Weights of cremated bone within anatomical categories and size ranges for deposits greater than 100g.

	>10mm					**10–5mm**					**5–2mm**					
Context	*Skull*	*Axial*	*Upper limb*	*Lower Limb*	*Unidentified*	*Skull*	*Axial*	*Upper limb*	*Lower Limb*	*Unidentified*	*Skull*	*Axial*	*Upper limb*	*Lower Limb*	*Unidentified*	*Total Weight*
583	8g	2g		24g	5g (55g misc lb)	11g	1g		2g	14g (127g misc lb)					249g	
594	19g	>1g			5g (62g misc lb)	19g	1g			16g (81g misc lb)					96g	400g
595	6g	2g	18g		6g	5g	1g			25g					68g	131g
598	19g			23g	48g	10g	1g			11g (misc lb)					9g	121g
605	38g	2g	3g		34g	13g	2g	1g		99g					134g	326g

misc lb = miscellaneous long bone

Table 5 Colours observed after heating of fresh goat bone (Mays 1998, Table 11.1).

May's results		**Shipman *et al*'s 1984 results**	
Temperature (˚C)	**Colour**	**Temperature (˚C)**	**Colour**
185	red/orange	under 285	white or yellow
285	dark brown/black	285–525	red/brown, red/yellow, dark grey/brown or dark grey
360	black		
440	grey/brown	525–645	black, blue or red/yellow
525	grey/brown (lighter than that observed at 440˚C)	645–940	white, light grey or light blue/grey
645–1200	white, some pale yellow	940	white, some grey or red/yellow

Thin section micromorphology

The sections were prepared from the undisturbed samples collected at the Micromorphology Laboratory, University of Stirling, following procedures based on Murphy (1986). All water was removed from the samples by acetone exchange and this was confirmed by specific gravity measurement. The samples were then impregnated using Polyester 'crystic resin type 1744' and the catalyst Q17447 (methyl ketone peroxide, 50% solution in phthalate). The mixture was thinned with acetone and a standard composition of 180ml resin, 1.8ml catalyst and 25ml acetone used for each Kubiena tin. No accelerator was used but the samples were impregnated under vacuum to ensure complete outgassing of the soil. The impregnated soils were cured for three to four weeks, culminating with four days in a 40°C oven. Resin impregnated soils were sliced, bonded to a glass slide and precision lapped to 30μm thickness, then cover-slipped to complete the manufacture of the thin section.

The manufactured thin sections were described using an Olympus BX-50 petrological microscope and by following the procedures of the International Handbook for Thin Section Description (Bullock *et al* 1985). This allows systematic description of soil microstructure, basic mineral components, basic organic components, groundmass and pedofeatures. A range of magnifications (×10–×400) and light sources (plane polarised, crossed polars and oblique incident) were used to obtain detailed description and these were recorded on a standard table (Table 6). Interpretation of the observed features rests on the accumulated evidence of a number of workers, notably Courty *et al* (1989) and FitzPatrick (1993), and on recent experience of palaeosols found under archaeological monuments elsewhere in Scotland (Davidson and Simpson 2001; Simpson and Davidson 1998 and 2000).

Results

The soil beneath the monument is a sandy loam with common and frequent sub-rounded and subangular large stones; distinctive small to medium-sized stones are also evident within the centre of the monument, where a secondary pit had been excavated. Munsell colours permitted a distinction to be made between fossil soil horizons that could be regarded as 'A' horizons (darker coloured top-soils; 7.5 YR 3/2) and 'B' horizons (lighter coloured and immediately below top-soil horizons in undisturbed soils; 7.5YR 4/4). The absence of an 'A' horizon in places suggests truncation of soils prior to monument construction.

Table 6 provides a summary of features observed in the five thin sections taken from Tomnaverie. The coarse mineral component in all of these is dominated by quartz, with significant fragments of granite and granitic diorite. The suite of mineral material is typical of soils derived from glacial tills and morainic material within the region. The prominent feature of the slides is the ubiquity of traces of biological reworking. There are many excremental pedofeatures and the structure over most of the slide areas could be characterised

Table 6 Details of soil thin sections from Tomnaverie.

	Coarse Mineral Material >20μm								Fine Mineral Material	Coarse Organic Material				Fine Organic Material			
Thin Section	Quartz	Granite	Granite Diorite	Bone	Compound Quartz	Feldspar	Biotite	Muscovite		Organ (vascular)	Tissue, charcoal	Tissue, uncharred	Fungal Sclerotica	Cell Residue	Amorphous, black	Matrix Coating, brown	Matrix coating,
Tom 1	****	*	*		*	**	*		Dotted brown & dark brown: organo-minera	*	*	**	*	**		###	#
Tom 2	****	**	*			*			Dotted brown: organo-mineral			*	*	*	**	###	#
Tom 3	***	**				*			Dotted drown: organo-mineral			*	*		***	##	
Tom 4	***	***				**			Dotted brown: organo-mineral		*	**			***	#	
Tom 5	***	**		**		*	*		Dotted brown: organo-mineral &grey mineral		*	*			***	#	

	Pedofeatures					Microstructure	Coarse Material Arrangement	Groundmass b-Fabric	Related Distribution
Thin Section	Amorphous								
Tom 1			**	***		Granular to intergrain microaggregate	Random, unreferred	Undifferentiated	Porphyro-gefuric
Tom 2	*	*	**	***		Spongy to crumb, channels present	Random, unreferred	Speckled	Porphyro-gefuric
Tom 3	*			***		Granular to intergrain microaggregate	Random, unreferred	Speckled	Porphyro-gefuric, locally gefuric
Tom 4	**		*	****		Biomodal granular: coarse mineral/excrement	Random, unreferred	Speckled	Gefuric, locally gefuric
Tom 5			**	***	*	Biomodal to crumb structure	Random, unreferred	Speckled	Gefuric, locally gefuric

Frequency class refers to appropriate Areas of section (Bullock *et al* 1985) Frequency class for textural palaeofeatures (Bullock et al 1985)

* Very Few ** Few *** Frequent/Common **** Dominant/Very Dominant # Rare ## Occasional ### Many

as fine granular to intergrain microaggregates. The majority of the excremental features are of the bacillo-cylindrical/spherical form associated with enchytraeids, and occasional mamillated excremental pedofeatures are observed, which are associated with earthworms. Such features and structure are characteristic of soils in which bioturbation is a significant, ongoing process. In comparison with the surrounding soils, there is relatively little evidence of podsolisation. There are only infrequent occasional to rare traces of the types of pedofeatures associated with such processes, primarily re-deposited iron amorphous pedofeatures and iron-depletion rim features. It cannot, however, be determined whether this is due to the burial of soils interrupting incipient podzolisation, or whether other factors have determined the lack of podsolisation in comparison with the local soils.

The outer ramp and the platform cairn (thin section samples 1–4; table 6)

The coarse mineral material dominates this fabric, ranging from rock fragments of several mm in size to fine sand (*c* 100μm), although the rock fragments are generally smaller in sample 4. The fine material is largely composed of circular and bacillo-cylindrical excremental pedofeatures, with the amount of excremental pedofeatures and degree of coalescence increasing with depth and in sample 2 where distinct channel voids are also present. There are occasional instances of reworking of mamillated excremental pedofeatures into circular forms. The colour of the fine material varies in sample 1 and includes interspersed brown and dark browns. The coarse organic material takes two forms: uncharred vascular plant material, which is very pale and heavily degraded, and strongly coloured parenchymatic material, some of which is in relocated positions wedged between rock fragments. Frequent black amorphous organic material is also distributed throughout these samples. Depletion pedofeatures and reddish brown amorphous cryptocrystalline are largely absent from these samples, with the exception of sample 4 where there are very few of these features. Those structural units that are not bioturbated and have a single spaced porphyric related distribution with planar to serrate edges include soil fragments and clods formed through rupture across natural surfaces. Two types of matrix coatings are found on coarse mineral material. One is dominantly brown and is composed of the fine organo-mineral material; the second matrix coating is composed of black fine organic material interspersed with coarser mineral material and is rarely found in samples 1 and 2.

Despite heavy and continuing reworking of these soils by soil organisms, especially enchytraeids, sufficient features remain to permit a limited interpretation of the land surface and activities immediately before monument construction. We suggest that the original land surface at the time of monument construction was an acid brown forest soil but with associated incipient podsolisation that was locally variable in its occurrence. The fossil soils also show evidence of disturbance prior to monument construction. Field observation of soils beneath this part of the monument, and fine material colour and coarse mineral material frequencies observed in thin section suggest that the soils have been truncated with removal of the 'A' horizon leaving a remnant 'B' horizon. The juxtapositioning of dark brown and brown material in sample 1 suggests that some of the original 'A' horizon remains, but has been mixed with 'B' horizon material. An alternative explanation for this characteristic is that new material has been introduced to this location to provide localised levelling of the land surface. Matrix coatings further support the interpretation that these soils have been disturbed and the two contrasting matrix coatings are distinctive, suggesting that disturbance may have been in two major phases. The matrix coatings are distinctive and their coarseness and lack of sorting indicate an abrupt and major disturbance rather than long-term micro-layered accumulation associated with frost activity or the dusty clay textural features of agricultural activity which can be found in 'B' horizons. We therefore suggest that these features relate to intensive preparation of the ground for the siting of the monument, possibly by deep deturfing, in a location that was marginal to subsistence activity.

The centre of the monument (thin section sample 5; table 6)

This sample comes from the filling of the later pit dug in the centre of the platform. Soil features observed in the thin section sample exhibit several distinct differences in composition in comparison

with samples 1–4. While the coarse mineral assemblage is comparable to that previously discussed, it is more rounded and there is evidence of mineral rubification (reddening), together with the frequent to common occurrence of bone fragments. Fine mineral material is typically brown organo-mineral with areas of grey mineral material and is not rubified. Matrix coatings are rare and where they occur are very thin, discontinuous and fragmented. Excremental pedofeatures are more clearly defined than in other slides and a wider range of types is observed. Some of the excremental pedofeatures are associated with Coleopteran and Dipteran larvae. There is no evidence of iron-rich amorphous cryptocrystalline pedofeatures or depletion pedofeatures indicative of podsolisation.

These observations suggest the introduction of heated mineral material and bone to the location of the monument rather than on-site, *in situ* cremation, which would also have rubified the surrounding fine mineral material. The rounded stone material is also introduced and can be considered as an incidental part of deposition. The presence of excremental pedofeatures of Coleoptera and Diptera larvae is of potential significance as these soil organisms are rapid colonisers. Given the relative lack of coalescence of the excremental pedofeatures it is possible to suggest that this deposited material was covered relatively rapidly after deposition, but probably not immediately.

2.7.5 CHARCOAL

Brian Matthews

The charcoal from the excavation was examined at the Forest Products Research Centre of Buckingham Chilterns University College. In the light of the radiocarbon dates the samples are best considered in two groups. Those from secure Early Bronze Age contexts below the recumbent contain the following species (in order of frequency from the most to the least abundant): hazel, alder, rosaceae and oak.

The second group comes from the centre of the cairn where the radiocarbon dates show there has been considerable disturbance and reworking of older deposits. Apart from those dated directly by radiocarbon, it is impossible to assign the individual samples to specific phases. Fortunately, the range of species is virtually the same in every archaeological context. In order of frequency from the most to the least abundant they are: alder, hazel, oak, rosaceae and pine. Alder, oak, and pine were not among the species represented by pollen in the buried soil, but hazel and rosaceae were present. In view of the evidence for fires in this part of the site, it seems likely that wood of the other species was introduced as fuel.

2.7.6 POLLEN ANALYSIS

Peter Brewer

Two samples were taken from Trench 7 on the old land surface beneath the cairn.

Pollen extraction

The pollen was extracted using the standard procedure outlined by Moore, Webb and Collinson (1991) using both hydrofluoric acid and acetolysis processes. Approximately one cubic centimetre of each sample was processed along with three *Lycopodium* tablets to allow assessment of pollen concentration. The exceptionally high levels of silica in the samples meant that two prolonged treatments with hydrofluoric acid were necessary. Even after such a severe treatment a relatively high level of silica remained, which caused problems with pollen identification.

Condition of pollen

The state of preservation of the pollen was relatively good considering that it was extracted from a once biologically active soil. The pollen, however, had degraded to some extent, a matter which must be considered when assessing the results of this study. *Lycopodium* to pollen ratios of approximately 1:3 illustrate the productivity of the two samples.

Results of pollen analysis

A total of 348 and 335 grains respectively were counted for the two samples. Table 7 outlines the results.

Discussion

It can be seen from the table that the two samples agree remarkably well with one another, despite their different positions on the land surface beneath the cairn.

The vast majority of the pollen counted was wild grass (Poaceae) and ferns (Filicales), with no trees

and few shrubs. The high proportion of Poaceae pollen indicates an open grassland landscape, and this is supported by the occasional grassland herb. The high proportion of ferns is likely to be due to differential preservation, for their pollen is extremely resistant to degradation and they are often over-represented in soil samples. The ferns are likely to be from damp local woodlands, perhaps bordering the loch that was once nearby. The hazel (*Corylus*) in the samples is likely to be from the same habitat. Surprisingly there was no birch in the samples. The only anomalous grain recorded was *Sphagnum*. This could have been growing on the site and must be either a contaminant or a grain that was transported from the edge of the loch.

2.7.7 RADIOCARBON DATES

There are three groups of radiocarbon dates from Tomnaverie. The first of these is on single pieces of charcoal from the filling of the small pit immediately below the rubble foundation for the recumbent stone (Table 8). The pit was dug from the surface of one of the steps cut into the natural slope of the hill to prepare a foundation for the cairn and these dates should provide a *terminus post quem* for its construction.

These dates have been analysed by Professor Sturt Manning who reports that all six cannot refer to the same event. The full set of determinations fails a Chi-Square test because AA-49283 is not of the same age as the rest. On the other hand, the remaining dates are consistent with one another. Since archaeological considerations suggest that they refer to the same event they can be combined as 3959 ± 23 BP. This can be calibrated as 2555–2538 BC, 2494–2457 BC or 2416–2409 BC at 68.2% probability, or 2564–2521 BC, 2498–2432 BC, 2423–2402 BC or 2367–2350 BC at 95.4% probability. The most likely date is in the 25th century BC.

The second group of samples came from the low deposit of burnt soil overlain by the inner edge of the cairn toward the centre of the platform (Table 9). These were expected to relate to the primary use of the monument, but in fact they belong to the same two phases as the material in the central pit, suggesting that this material may have percolated down through the rubble of the monument during later periods of re-use.

Table 7 Details of the pollen samples from Tomnaverie.

	Sample 622		**Sample 624**	
	Number	**Per cent**	**Number**	**Per cent**
Lycopodium marker	120	–	97	–
Concealed	4	1	8	2
Deteriorated	38	11	46	13
Corylus	23	7	29	8
Poaceae (wild)	152	44	119	34
Aster type	1	0	2	1
Rosaceae	1	0	0	0
Sphagnum	1	0	0	0
Drypoteris	4	1	1	0
Osmunda	1	0	0	0
Polypodium	20	6	29	8
Pteridium	1	0	4	1
Filicales endospore	102	29	97	28
GRAND TOTAL	348	–	335	–
UNIDENTIFIABLE	42	12	54	16
SHRUBS	23	7	29	8
HERBS	154	44	11	35
SPORES	129	37	131	38

Table 8 Radiocarbon dates from below the recumbent stone at Tomnaverie.

				Calibrated dates	
Lab code	**Sample material**	**Yrs BP**	**C ‰**	**1 sigma**	**2 sigma**
AA-49279	Alder charcoal	3975 ± 40	–27.2%	2570–2510 BC or 2500–2450 BC	2580–2390 BC or 2380–2340 BC
AA-49280	Alder charcoal	3985 ± 45	–26.8%	2580–2460 BC	2630–2340 BC
AA-49281	Alder charcoal	3985 ± 55	–27.1%	2620–2610 BC or 2580–2450 BC	2700–2300 BC
AA-49282	Alder charcoal	3850 ± 55	–27.5%	2460–2420 BC or 2410–2270 BC	2470–2190 BC or 2180–2140 BC
AA-49283	Alder charcoal	3740 ± 60	–27.4%	2280–2250 BC or 2230–2220 BC	2340–1950 BC
AA-49284	Alder charcoal	3985 ± 85	–26.7%	2580–2460 BC	2630–2340 BC

The third group of samples came from the filling of the charcoal-filled pit excavated through the centre of the monument (Table 10). It was originally thought to date from the Late Bronze Age on the basis of the associated pottery and cremated bone, but now it seems that this was residual material derived from the layer through which it had been excavated. The pit itself was clearly post-medieval.

2.8 DISCUSSION: THE EVOLUTION OF THE RECUMBENT STONE CIRCLE AT TOMNAVERIE

The introduction to this study summarised a number of the debates over the interpretation of recumbent stone circles. Were they Neolithic or Bronze Age? Had they been used over a long period of time? Were the stone circles the earliest components of these sites, and had the cairns inside

Table 9 Radiocarbon dates from the centre of the platform at Tomnaverie.

				Calibrated dates	
Lab code	**Sample material**	**Yrs BP**	**C ‰**	**1 sigma**	**2 sigma**
AA-49291	Charred alder twig	2795 ± 45	–25.4%	1010–890 BC or 880–860 BC	1050–820 BC
AA-49292	Charred alder twig	2870 ± 45	–25.6%	1130–970 BC or 960–940 BC	1220–900 BC
AA-49293	Charred alder twig	2795 ± 45	–25.2%	1010–890 BC or 880–860 BC	1050–820 BC
AA-49294	Hazel charcoal	305 ± 40	–27.1%	AD 1510–1600 or AD 1620–1650	AD 1480–1660
AA-49295	Hazel charcoal	385 ± 40	–27.1%	AD 1440–1520 or AD 1590–1630	AD 1430–1530 or AD 1540–1640
AA-49626	Alder Charcoal	410 ± 30	–26.7%	AD 1440–1487	AD 1430–1530 or AD 1590–1630

Table 10 Radiocarbon dates from the central pit at Tomnaverie.

				Calibrated dates	
Lab code	**Sample material**	**Yrs BP**	**C ‰**	**1 sigma**	**2 sigma**
AA-49285	Charred alder twig	510 ± 35	–26.6%	AD 1407–1436	AD 1320–1350 or AD 1390–1450
AA-49286	Charred alder twig	380 ± 40	–25.0%	AD 1440–1530 or AD 1590–1630	AD 1440–1530 or AD 1540–1640
AA-49287	Charred alder twig	410 ± 40	–27.4%	AD 1430–1520 or AD 1600–1620	AD 1440–1530 or AD 1560–1640
AA-49288	Charred alder twig	305 ± 40	–25.6%	AD 1510–1600 or AD 1620–1650	AD 1480–1660
AA-49289	Alder charcoal	335 ± 40	–27.3%	AD 1490–1530 or AD 1540–1640	AD 1460–1650
AA-49290	Alder charcoal	485 ± 40	–26.7%	AD 1409–1444	AD 1330–1350 or AD 1390–1480

them developed at a later date? This excavation provided some of the answers.

The dating evidence from Tomnaverie is limited but consistent. The only datable finds associated with its primary use were sherds of Beaker pottery. All the radiocarbon dates associated with the construction of the stone-built platform fall between about 2600 and 2000 BC and five of the determinations can be combined to suggest a date in the 25th century BC. This suggests that at least one part of the cairn was built early in the period when Beakers were used in north-east Scotland. The sherds from Tomnaverie are rather later in date, perhaps because the cairn was constructed over a significant period of time.

The second question was one of sequence. This is more clearly answered. The recumbent stone circle at Tomnaverie was the last structure to be built, although the site was re-used during the Late Bronze Age and again in the 16th or 17th century AD. That sequence may have implications for other stone circles in north-east Scotland, a possibility which is explored in later sections of this account. But it would be wrong to overlook the very individual character of this evidence. It is easy enough to divide the development of Tomnaverie into a series of structural phases, as if the monument consisted of a sequence of superimposed buildings, each in a different architectural style. Are there other ways of thinking about these observations?

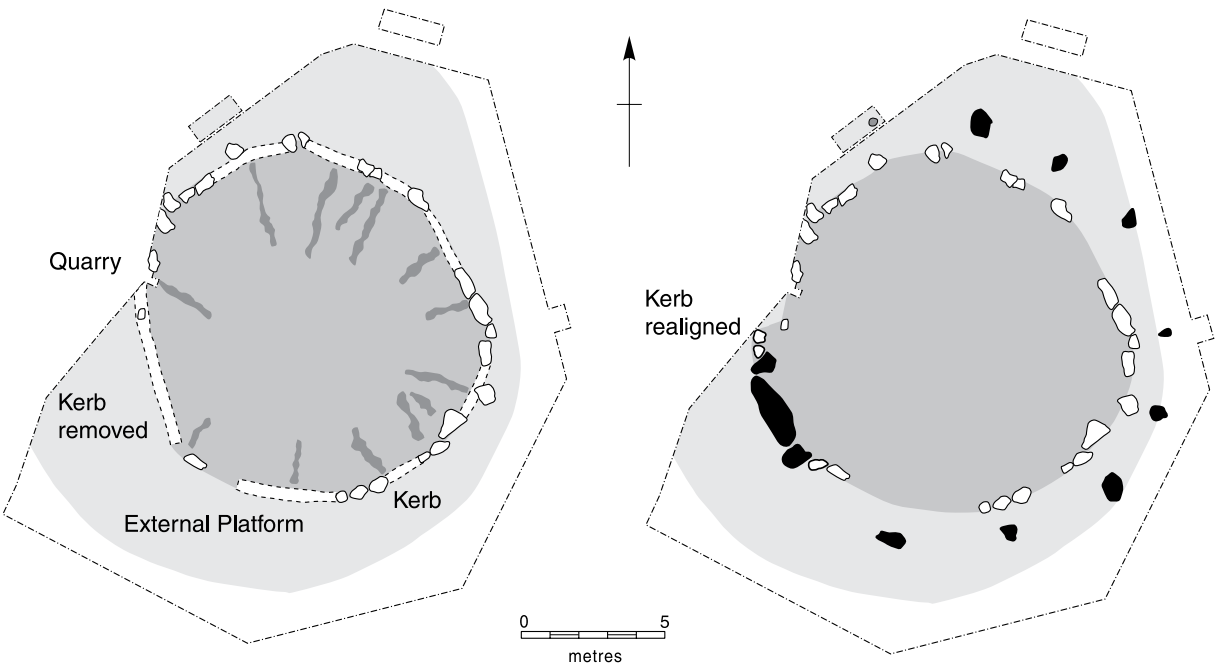
It seems that the entire sequence recovered by excavation was conceived by the builders from the outset. The successive elements were fitted on to one another in a predetermined order until the process reached its conclusion. Little was left to chance and the nature of the monument was not altered radically from the moment of its inception. That is very different from the history of other monuments, whose significance was reinterpreted until their fabric was transformed. Each successive phase in the stratigraphic sequence presupposes those that were to follow later, and thus the unfolding of the structural history of the monument is rather akin to a narrative (illus 55). It may even have played a part in a prescribed ritual or series of rituals. Like other sites of the same type, Tomnaverie may have been aligned on the moon. How far was this influenced by activity on the hilltop before building work commenced?

In principle, any conspicuous fire that had been lit on the ridge top could have been observed from much of the surrounding area, just as the excavation team were able to observe moor-burning on the horizon from the site of the stone circle. The same may apply if the hill had been the site of a post-medieval beacon; a nearby field was

certainly used for bonfires to celebrate public events during the 19th century. The one characteristic that distinguishes this particular position is that it is the only place which combines a view towards Lochnagar and the northernmost position of the moon (Ruggles 1999, Tables 5.1–5.3). Any further to the south and the position of the moon would not coincide with the summit of the mountain. Any further to the north and Lochnagar might not have been seen.

The platform that was constructed around the hilltop had an unusual character. It extended across the contours where the gradient was steepest even though this meant that more material was needed to build it. So important was it to maintain a roughly level surface that it was necessary to cut a series of shallow steps into the slope to support the mass of this monument. It may be relevant that these were closer together where the outer ramp would eventually have to bear the weight of the recumbent stone. The surface of the cairn was clearly divided into separate segments. On a small scale this was achieved by the way in which it incorporated a number of radial divisions, but these also served to separate it into two distinct halves, one to the north-east and the other to the south-west. This is shown in a more subtle manner by the grading of the kerb. The distinctive character of that kerb also distinguished its eastern perimeter (and perhaps the corresponding sector to the west) from the lengths to the north and south which were built out of slabs rather than blocks. In addition, the platform was supplemented by an extensive bank of rubble. It was especially massive to the west where its outer edge included large pieces of quartz. All these features – the construction of the cairn and platform, the layout of the kerb, the location and symmetrical arrangement of the radial divisions – seem to anticipate the construction of the recumbent stone circle. In particular, the placing of the radial lines of stonework prefigure the organisation of space in the following phase, with its emphasis on the south-west.

Two elements are especially important here: the creation of a substantial platform and the positioning of a long straight section of kerb along its south-western limit. The effect of building a platform that extended beyond the break of slope was to obscure the immediate foreground and to creat a vista that focused on the middle distance and beyond. The longest stretch of kerb, the ends of which are marked by the radial divisions on the south-west side of the cairn, gave it greater definition and emphasised an alignment that may



55 The structural sequence at Tomnaverie, showing the transformation of the platform cairn when the recumbent stone circle was built.

have been in people's minds from the earliest use of the site.

If so, the configuration of the recumbent stone circle becomes easier to understand for it was integrally linked to what had already happened at Tomnaverie. There are several clues. The part of the existing platform that was to support the largest stones had been provided with a suitable foundation well before the monoliths were put in place. The radial divisions which formed part of the same construction were integrally linked to the positions of some of the uprights, and two more indicated the places where the cairn was to be extended to join the circle. This amounted to more than prehistoric quantity surveying for when it happened a substantial length of kerb was demolished and replaced. It is interesting that the new section retained the grading by height already seen at this monument. Now that effect was echoed by the standing stones.

In other respects the construction of that circle scarcely marks a radical departure. The newly built sections of kerb were carefully integrated with the flankers by using very similar raw materials. On the opposite side of the monument some effort seems to have been made to match the newly-erected monoliths to the character of the existing kerbstones. It would have been difficult to drag the largest stones into position across the steep flank of the existing cairn, but the creation of the recumbent stone circle did not effect a major alteration of the monument; rather, it enhanced its distinctive features and gave them added definition. That is surely indicated by the distinctive configuration of the recumbent stone and the flankers. These emphasised the orientation that had been a feature of Tomnaverie from the outset but they did so on a monumental scale. Once that had happened the entire construction remained unchanged. The building project was complete and the monument had achieved its definitive form. The reasons for these developments will be considered in Chapter 5.